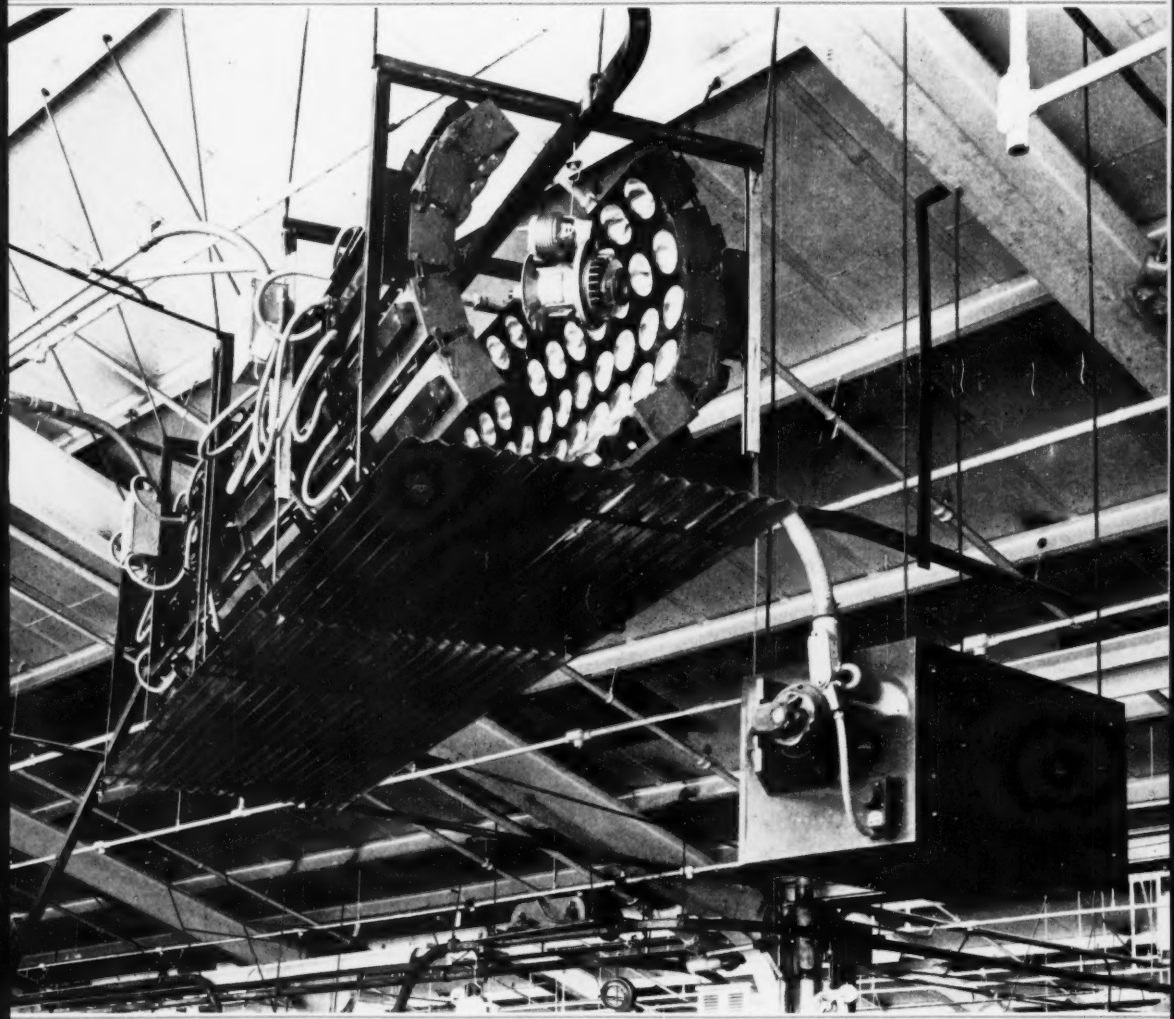
ELECTRICAL WEST

October 1949
25 Cents



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SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

ad-vantage

point

breakfast's a breeze
dinner's a winner
WHEN YOU COOK ELECTRICALLY!
From the bacon to the baking, there's less "irk" in your work when it's done on a modern electric range. A tastier meal in a matter of minutes—that's what you get when you cook the modern way.
No wonder it's called "miracle cookery"—you don't even have to be there. A modern electric range is completely automatic and absolutely dependable. Just prepare the food, set the controls and leave it to its own devices!
BUDGET WISE
Electric ranges—the finest ever made—are lower in price, cheaper to operate. See your dealer.
SOUTHERN CALIFORNIA EDISON COMPANY
Edison

Just as a matter of interest—yours and ours—let's take one of the Edison newspaper advertisements and examine it scientifically. Point by point, it is aimed at making sales for electrical appliance dealers in Edison territory.

First the headline and illustration—attention-getters to encourage further reading. Next, the text—written to appeal to a specific customer desire (show us the housewife who doesn't want easier, better cooking!) Then the follow-through—an urge for action by the customer: *See your dealer.*

If you're an appliance dealer, you're a part of every Edison advertisement. That's *you* out there on the vantage point!

SOUTHERN CALIFORNIA EDISON COMPANY Edison

WE STOPPED THEIR BREATHING TO PROLONG THEIR LIFE!

On large tanks, Nitrile rubber gasket of circular cross-section is compressed as shown. Ring welded to tank keeps gasket in place—prevents too much compression.
On small tanks, Nitrile rubber gasket of square cross-section is compressed between rim of cover and deep-rolled flange on tank. Shown uncompressed.

In G-E Spirakore® transformers, Nitrile rubber gaskets—unharmed by oil, age, or operating temperatures—effectively seal out atmospheric air, moisture, and other contamination—thereby greatly prolonging the life of the insulating oil and consequently the units themselves. By redesigning the tanks, covers, handholes, and gaskets, we've made this sealing possible *and improved accessibility!*

Some years back,we sealed our power transformers completely. Now we've done it with all liquid-immersed, distribution transformers. We've stopped their breathing, too. We've made sealed tank construction available in all General Electric Spirakore transformers—from the smallest to the largest.

Other Improvements

Yet sealed-tank construction is only one of the improvements you get with General Electric distribution transformers. You get Spirakore design—for great savings in size and weight. You get improved impulse strength. You even get a new and better baked synthetic-resin paint, which reduces maintenance costs.

Today—as ten years ago when lighter, smaller Spirakore transformers first made history—Spirakore still leads the field. It's the finest distribution transformer we have ever made, the finest you can buy. Ask for Bulletins GEA-4885 and GEA-4521. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

Spirakore Transformers

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

OCTOBER 1949

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.
The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-second year of publication

ELECTRICAL WEST

James H. McGraw (1860-1948), Founder
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Peggy Boyer, Assistant Editor — R. A. Balzari, Publishing Counselor
John W. Otterson, Manager — John Cootz, Typography

NEXT MONTH

Where the Pacific Southwest will get its future water supply is the burning question. Alfred M. Cooper, an authority on water resources, gives his answer in a piece that will appear in the November issue. Engineering-wise, there will be pictures and information on a new 110-kv. line passing over Donner summit in the High Sierra. Economy of light-steel transmission towers: another in the series on preventive maintenance, and research dealing with negative ions and sinus trouble will be other features.

The whole problem of glare from lighting fixtures and how to solve it is the subject of a profusely illustrated article by Charles W. Macy, PG and E. Then there will be another of the valuable Northwest data sheets on heating applications.

In a thought provoking talk to Washington contractors, an Idaho contractor analyzed some of the major problems all contractors face and an approach to their solution. His paper will appear, together with a report on that convention. The two inspectors' conventions, at Butte and San Diego, also will have their significant thoughts reported. Electrical Distributors meeting at Coronado will be briefed likewise.

Sales Guide will feature Christmas gift selling: news letter tells what's cooking.

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Cover photo: Infrared tunnel mounted to ceiling in Los Angeles plant of McCulloch Motors Co.

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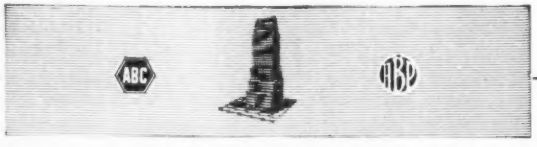
Chicago (11) ... Philip S. Griffin, 520 N. Michigan Ave.
Cleveland (15) ... Frank J. Seiler, 1510 Hanna Bldg.
Los Angeles (14) ... W. D. Lanier, 621 S. Hope St., MI. 3691
New York (18) ... John P. Eichorn, 330 W. 42nd St.
San Francisco (4) ... Tom Carmody, 68 Post St., DO. 2-4600



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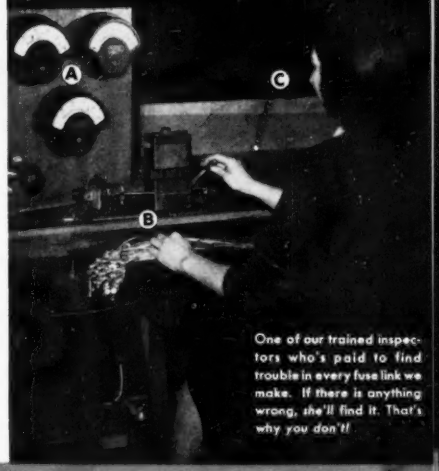
VOL. 103 NO. 4

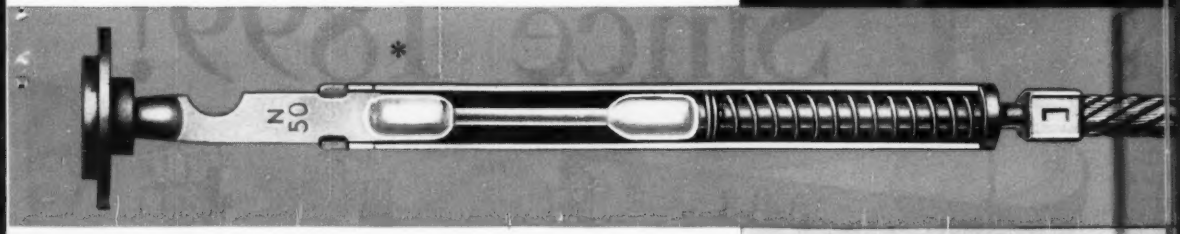
ELECTRICAL WEST (with which is consolidated The Journal of Electricity). October, 1949. Vol. 103. No. 4. Published monthly by McGraw-Hill Co. of Calif. Price 25 cents a copy. Publication office, 621 So. Hope St., Los Angeles 14, Calif. Executive, Editorial and Circulation offices, Electrical West, 68 Post St., San Francisco 4, Calif. Entered as second class matter April 17, 1947, at the post office at Los Angeles, Calif., under the Act of March 3, 1879. Printed in U. S. A. Subscription rates—U. S., U. S. Possessions and Latin American Republics: $2, 1 year; $3, 2 years; $4, 3 years. Canada: $2.50, 1 year; $5, 3 years. Other countries: $3, 1 year; $5, 2 years; $4, 3 years. Copyright, 1949, McGraw-Hill Company of California. All rights reserved.

She bets we'll be wrong... in either case, YOU WIN!

Every L-M UNIFIT FUSE LINK is individually tested



One of our trained inspectors who's paid to find trouble in every fuse link we make. If there is anything wrong, she'll find it. That's why you don't!



One bad apple may spoil the barrel. One bad fuse link could make a lot of trouble for our customers. So, to assure complete reliability, we test every individual L-M fuse link. Not one in a thousand, not spot checking, but *every one*, gets the "works." Tested for accuracy! Tested for coordination! Tested for strength, and mechanical construction!

We think L-M is the only fuse link manufacturer giving 100% inspection. It takes more work—sure—but that's why L-M links have such an enviable reputation for accuracy—especially among men to whom precise coordination is important. For details on L-M's very complete line of fuse links, ask the L-M Field Engineer or write *Line Material Co., Milwaukee 1, Wisconsin.*

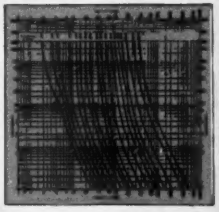
Fuse Coordination your problem?

In addition to making our fuse links so they will coordinate, we have developed a fairly complete manual on Fuse Coordination. Men who have used it have been very complimentary about it. If *you* have a fuse coordination problem and would like a copy, drop us a note.

*Only L-M can give you a link like the one shown above! This is a 50-amp spring type link in die-cast construction, an L-M exclusive process!

Here's what our inspectors check:

(A) Accuracy of Rating for Precise Coordination:
Every link must coincide closely with the melting and clearing time curves. Millivolt tests show whether the link is accurate. If not, out it goes—to the scrap pile, not to the customer. That's why you can depend on L-M links for coordination.



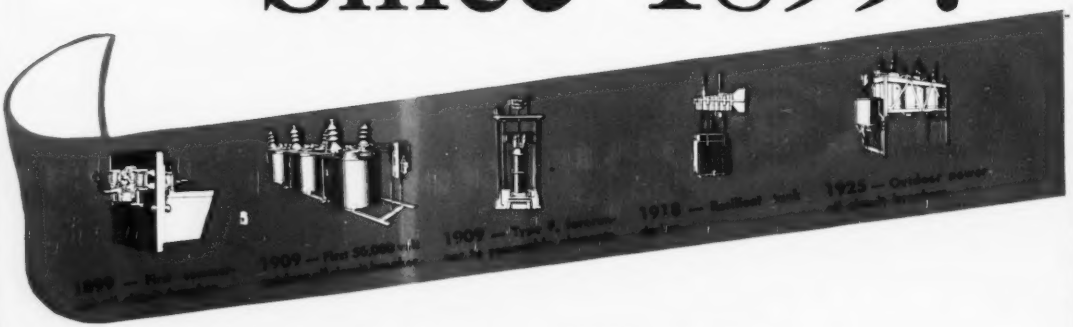
(B) Pull Test:
NEMA specifies a 10 pound test so that links won't pull apart needlessly under cutout tension. Ours pass that test with a good margin of safety—or you never get them!

(C) Physical inspection:
To weed out any other possible faults. Every L-M link gets a pretty critical once-over—it's gotta be good!

LINE MATERIAL Fuse Links

Complete Coordinated Equipment for All Distribution Requirements

Building Power Circuit Since 1899!



New ASA Ratings up to 230 kv, 7,500,000 kva Typify Allis-Chalmers 50-year Progress Toward Increased Interrupting Capacities, Higher Operating Speeds, Lower Cost Maintenance.

FIFTY YEARS OF PROGRESS in any industry is an accomplishment. In power circuit breakers it represents the *entire history*. For in 1899 the first commercial oil circuit breaker for Central Stations was built, in what is now Allis-Chalmers Boston Works.

Since then many milestones of design progress have been covered. Today, Allis-Chalmers offers you a complete line of both indoor and outdoor breakers, designed and built to meet *today's* exacting standards.

Whatever your particular power circuit breaker requirements, an Allis-Chalmers sales representative will be glad to call and discuss them with you. District Offices located in all principal cities.

A-2846

ALLIS-CHALMERS, 939A SO. 70 ST.
MILWAUKEE, WIS.

Ruptor and *Unitop* are Allis-Chalmers trademarks.

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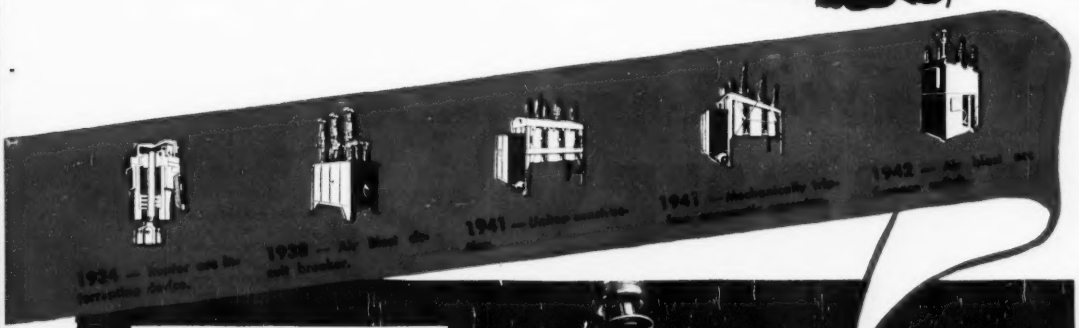
Pioneers in Power and Electrical Equipment from Generation through Utilization

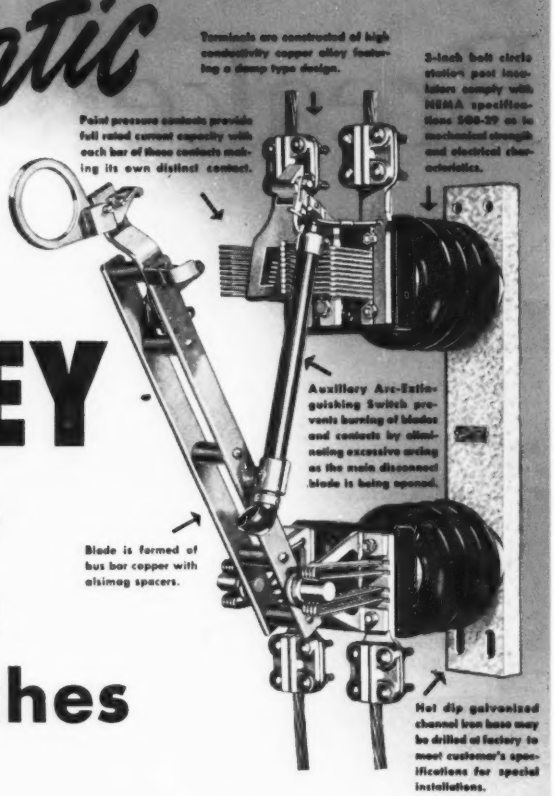
Fine Breakers



1947 1948 1949

Supervoltage power circuit breakers with 3 or 5 cycle interruption, 161 and 230 kv, interrupting capacities up to 7,500,000 kva.

Safe Switching Sequence is Automatic with KEARNEY Regulator By-Pass Switches


Terminals are constructed of high conductivity copper alloy featuring a clamp type design.
3-inch bolt circle station post insulators comply with NEMA specifications 200-29 as to mechanical strength and electrical characteristics.
Point pressure contacts provide full rated current capacity with each bar of these contacts making its own distinct contact.
Auxiliary Arc-Extinguishing Switch prevents burning of blades and contacts by eliminating excessive arcing as the main disconnect blade is being opened.
Blade is formed of bus bar copper with alsimag spacers.
Hot dip galvanized channel iron base may be drilled at factory to meet customer's specifications for special installations.

Eliminate the hazards of opening the wrong disconnect. Pull *one* ring and take care of four distinct switching operations — by pass the main line, open both leads to the regulator and interrupt the exciting current. Restore the regulator in service simply by closing the By-Pass Switch as you would any other disconnect switch. Simple, safe and entirely automatic.

JAMES R. KEARNEY CORPORATION 4224-42 Clayton Avenue, St. Louis 10, Mo.

Canadian Plant • Guelph, Ontario

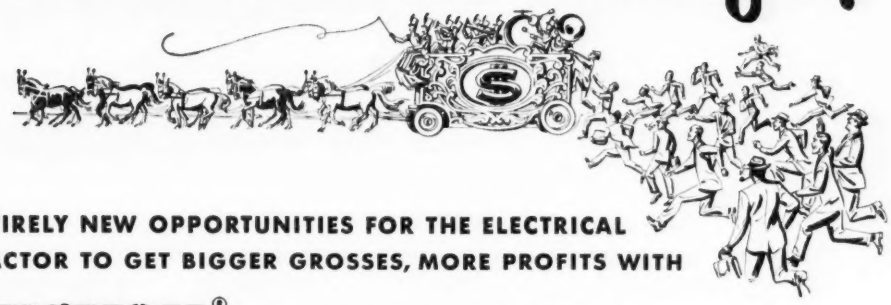
West Coast Distributor: MAYDWELL & HARTZELL

Always Specify JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. *for the Job...*

142

Better Construction — SAFER Maintenance

"Get Aboard this Profit Bandwagon!"



ENTIRELY NEW OPPORTUNITIES FOR THE ELECTRICAL CONTRACTOR TO GET BIGGER GROSSES, MORE PROFITS WITH

USKON® RADIANT HEATING UNITS

USKON is the world's most modern heating system—and it's the *exclusive* business of the Electrical Contractor. Uskon actually puts you, the contractor, into the heating business, triples your dollar volume—while giving the customer a more efficient heating system.

WHAT IS USKON? Uskon heats by radiation, as does the sun. The heating units are electrically conductive rubber sheets, sandwiched between rigid insulating layers. Installed in the ceiling, these panels provide even, healthful warmth. The conventional boiler, radiator, pipes, fuel storage, chimney and cellar are eliminated. Uskon is invisible, the panels become part of the ceiling structure.

ALL USKON INSTALLATIONS WILL BE HANDLED BY ELECTRICAL CONTRACTORS. Installation of Uskon is simple, but each job must be specifically designed to the particular requirement. U. S. Rubber building wire is used. An Uskon job will require from four to five times more wiring materials and labor than the usual contract.

SUBSTANTIAL MARGINS OFFERED TO THE CONTRACTOR. For selling and properly installing Uskon, the electrical contractor receives a substantial margin. In commercial and industrial applications the profit opportunities are proportionately greater.

Take advantage of this opportunity to get into the heating business. Write Uskon, Graybar Electric Company, 420 Lexington Avenue, New York 17, N. Y., or direct to Electrical Wire and Cable Department, U. S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y.

NO FURNACE, NO PIPES, NO FUEL STORAGE • NO ASHES, DIRT OR DUST
NO RADIATORS. USKON IS "INVISIBLE."

NOW APPROVED BY UNDERWRITERS' LABORATORIES, Inc.

A PRODUCT OF U.S.RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

YOU CAN BE SURE.. IF IT'S
Westinghouse

PROOF
FROM
ALABAMA

"We eliminated load checks costing $12 a piece"

The way this southern utility uses Westinghouse "CSP"* transformers to eliminate load checks is a prize example of the moneysaving features in these Completely Self-Protecting units.

With many thousand "CSP" transformers on 7,200 volt lines, their records show this comparison:

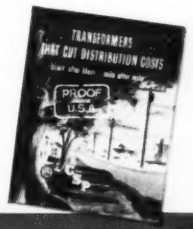
On conventional transformers, they fused for a minimum of 200% of load, but changed the transformer to a larger size when the load reached 150% of the rating. This load was determined from (1) a specific load check, (2) specific knowledge of added load or (3) records of abnormal fuse outages. It cost $6 to replace a fuse, and approximately $12 to make a load check. Since a transformer would not be changed on just one fuse outage, there was always a minimum total cost of $12 for a load check.

With "CSP" transformers, they use the red signal light as a positive indication that the limit of safe *thermal* loading has been reached.

You can be sure of this: Using "CSP" signal lights instead of making expensive load checks cuts operating costs. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70523

**Trademark—Reg. U. S. Pat. Off.*

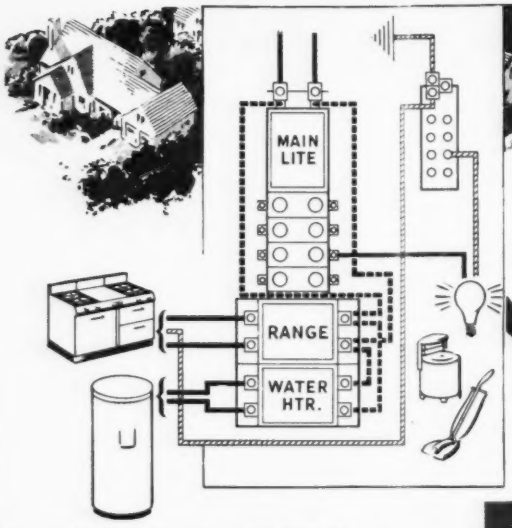
WANT MORE FACTS? Here are 36 pages of product information you'll want to have about Completely Self-Protecting transformers. Covers construction, operation, mounting and servicing. Ask for B-4249.



Call the Westinghouse Salesman

Westinghouse "CSP" TRANSFORMERS

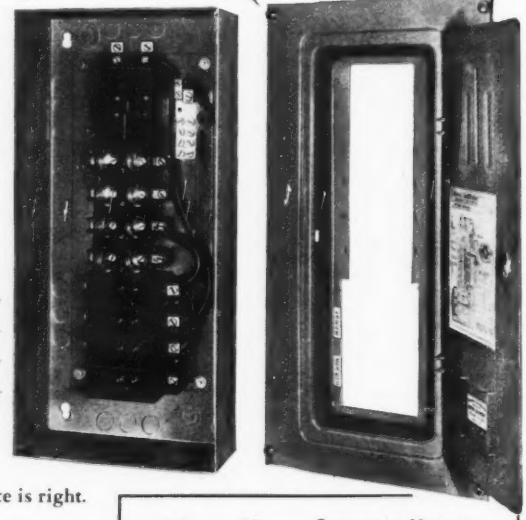
Made in the WEST.. for the WEST



A NEW Reason why the Switch is to General

General Switch Cat. No. 663-108, Main-Range-Water Heater Combination Triple Pullout Unit

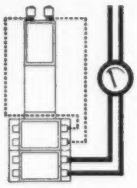
100 Amp main lugs feed the 60 Amp pull-out switch controlling from 4 to as many as 12 plug fused lighting circuits. The main lugs also feed the Range and Water Heater pullout switches . . . available in 30 or 60 Amp and non-interchangeable to prevent overfusing. Flush or Surface. Underwriter Laboratories approved.



THE new GENERAL Main-Range-Water Heater Combination Triple Pullout Unit, the latest addition to the GENERAL SWITCH extensive line of enclosed switches and panels, means a real saving in time and materials, is a neat, compact unit, is thoroughly dependable and . . . the price is right.

The development of this all-in-one unit is another step forward in the GENERAL SWITCH planned program of product development of "unitized" equipment for simplified electrical systems at lower cost.

Save time and save money . . . investigate this new unit and *Switch to* GENERAL *today*! Available everywhere exclusively through wholesalers.

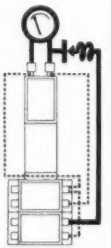


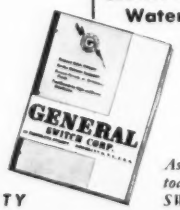
Separate Meter for Water Heater

Simply remove jumpers and feed the water heater pullout switch through separate meter.

Carrier Relay or Time Clock Water Heater Disconnect

Remove one jumper and connect water heater switch through disconnect element of meter.





Ask your wholesaler or write today for the GENERAL SWITCH 68-page catalog.

General Switch Corp.

49 Roebling Street Brooklyn 11, N. Y.

SALES OFFICES IN EVERY MAJOR CITY

THIS NEW GUIDE MAKES BOX SELECTION EASY!

Now, to make your specification job easy and sure, General Electric offers free a new switch and outlet box chart. A quick glance tells you the outlet, switch or utility box that's right for your wiring job.

This new chart gives number of conductors, by wire size, permitted by Code regulations for various sized boxes. Also, as a handy guide when reading or laying out building plans or wiring diagrams, we've included that section of the National Electrical Code covering box sizes.

To get your free copy, see your G-E Construction Materials distributor, or fill in and mail the coupon below.

And, don't forget, your General Electric Construction Materials distributor carries a really complete line of conduit products. On your next order, why not try the time-saving, "one-stop, one-package" service he can offer? Because he carries the complete General Electric Conduit line you can order every item you need from him. It's the kind of service busy contractors need to help stretch scarce working hours.

Section C28-1025
Construction Materials Department
General Electric Company
Bridgeport 2, Connecticut

Please send me a free copy of your new Switch and Outlet Box Chart.

Name_____

Company_____

Street_____

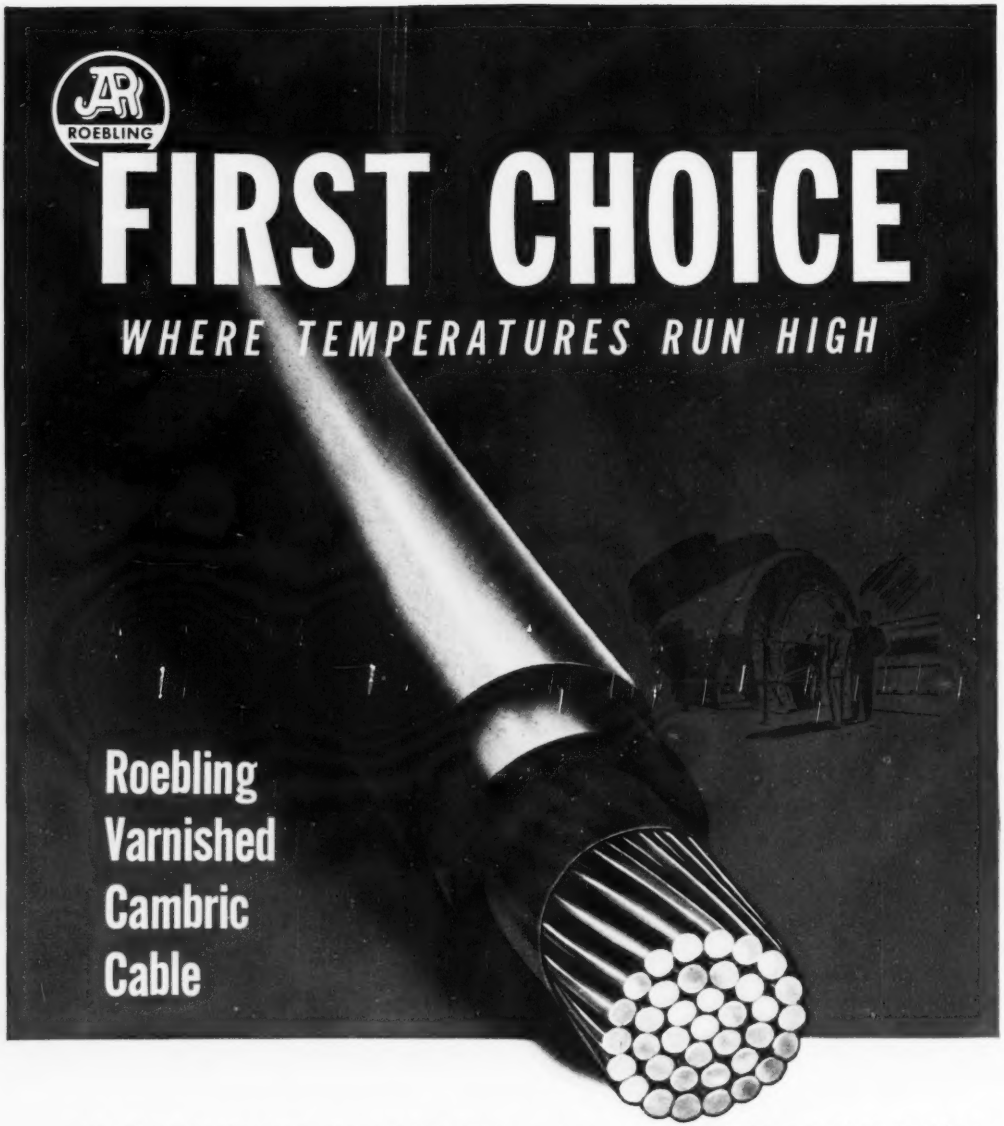
City_____ Zone_____ State_____

GENERAL ELECTRIC

JAR ROEBLING

FIRST CHOICE

WHERE TEMPERATURES RUN HIGH



HEAT RESISTANCE YOU CAN COUNT ON

FOR TOPFLIGHT DEPENDABILITY where heat is a hazard, turn to Roebling Varnished Cambric Cable! You'll find it far superior to rubber-insulated cables for motor and generator leads and it is outstandingly adapted for transformer and oil switch leads.

Roebling Varnished Cambric Cable comes in single and multiple conductor types—single, from 2,000,000 C. M. to No. 14 A.W.G. Designed for use up to 17,000 volts between phases for unshielded multiple conductor . . . up to 21,000 volts between phases for single conductor and shielded cables on ungrounded neutral systems . . . up to 28,000 volts between phases for single conductor and shielded cables on grounded neutral systems.

Write us, or get in touch with your Roebling Distributor. John A. Roebling's Sons Company of California, San Francisco, Los Angeles, Seattle, Portland.

WRITE OR CALL THE ROEBLING FIELD MAN AT YOUR NEAREST ROEBLING OFFICE AND WAREHOUSE

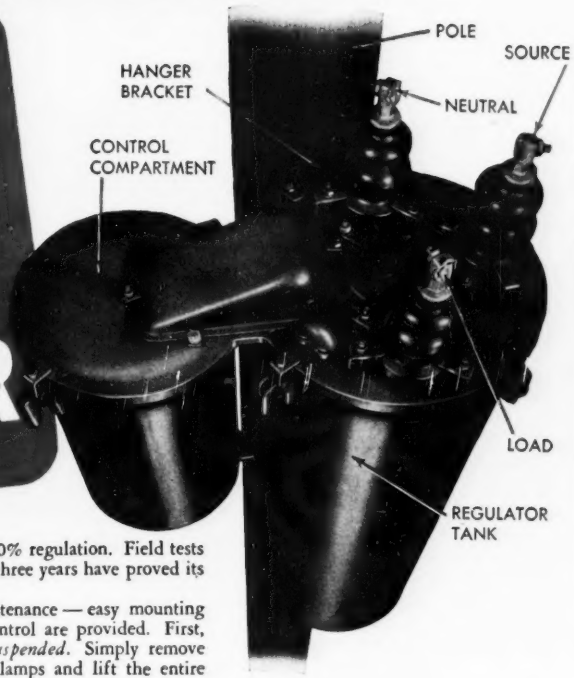
Atlanta, 934 Avon Ave. ★ *Boston*, 51 Sleeper St. ★ *Chicago*, 5525 W. Roosevelt Rd. ★ *Cleveland*, 701 St. Clair Ave., N. E. ★ *Denver*, 1635 17th St. ★ *Houston*, 6216 Navigation Blvd. ★ *Los Angeles*, 216 S. Alameda St. ★ *New York*, 19 Rector St. ★ *Philadelphia*, 12 S. 12th St. ★ *Pittsburgh*, 855 W. North Ave. ★ *Portland, Ore.*, 1032 N. W. 14th Ave. ★ *San Francisco*, 1740 17th St. ★ *Seattle*, 900 First Ave.

ROEBLING

☆ A CENTURY OF CONFIDENCE ☆

Keep Voltage Constant on Rural Lines!

NEW ALLIS-CHALMERS Pole-Type VOLTAGE REGULATOR



- ✓ **Improves service — cuts complaints**
- ✓ **Provides full 20% range of regulation (10% raise and lower)**
- ✓ **Ups revenue by increasing line and system capacity.**
- ✓ **Costs but a few dollars per customer on average line**

FOR THE FIRST TIME, you can get complete voltage regulation for rural lines at low cost. Here's an economical, flexible method for keeping voltage constant at a point on a line, regardless of load changes or cause of voltage difficulties.

The New Pole Type voltage regulator is fully automatic . . . regulates line voltage through a range of 20% in 32 small 5/8% steps, and holds ± 1 volt band. Rating is 10.8 kva, 15 amp., 7200 v, ± 10% regulation. Field tests for the past three years have proved its reliability.

Easy maintenance — easy mounting — simple control are provided. First, it is *cover-suspended*. Simply remove four cover clamps and lift the entire regulator from the tank. . . . Contact life is long. Quick-break mechanism eliminates arcing and pitting. In addition, because of small 5/8% steps, contacts interrupt smaller kva — last longer. Unit is mounted on pole as easily as distribution transformer. Control requires just two simple knob adjustments to set.

Ask an Allis-Chalmers field engineer to determine the best means of improving voltage conditions on your rural system using voltage regulators. Contact a nearby A-C district office or send in the coupon.

WRITE FOR NEW BULLETINS

ALLIS-CHALMERS, 939A SO. 70 ST.
MILWAUKEE, WIS.

☐ Send me descriptive bulletin 6424, plus "When and Where to Apply Rural Voltage Regulators" bulletin 6409.

☐ Have engineer call.

Name.....

Title.....

Company.....

Street.....

City.....

State.....

A-2780

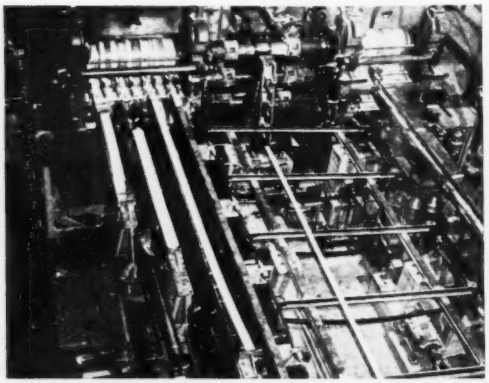
ALLIS-CHALMERS

Pioneers in Power and Electrical Equipment from Generation through Utilization

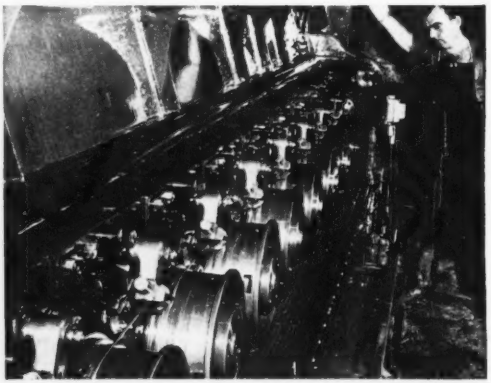
A-C ALLIS-CHALMERS

Why you can depend on Kaiser Aluminum Conductor

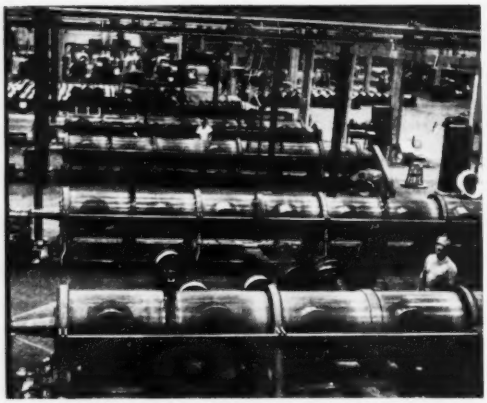
You're sure of dependable supplies of Kaiser Aluminum Conductor—because Permanente Metals' fully integrated production includes all this under one roof at centrally located Newark, Ohio:



1. Rod Rolling—Cast from high purity Kaiser Aluminum pig from Permanente Metals' two reduction plants, ingots pass through breakdown mills to become rods for wire drawing.



2. Drawing—On the most modern equipment in the aluminum electrical conductor industry, Kaiser Aluminum rod is drawn into wire. Here it passes through a series of ten dies.



3. Stranding—Manned by experienced, highly skilled personnel, cable stranders for Kaiser Aluminum electrical conductor spin at high speed. Finished conductor emerges at the left.

4. And the most valuable asset of all: Knowledge of your conductor problems, and the ability to send your shipment of Kaiser Aluminum Conductor out on time.

Do you need aluminum conductor? To take advantage of early delivery schedules, contact any office of Permanente Products' nationwide sales organization.

Permanente Metals

PRODUCER OF

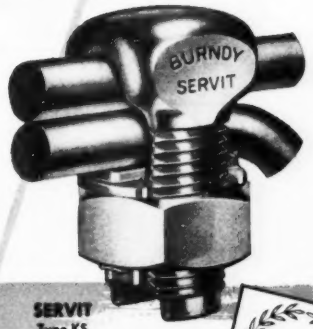
Kaiser Aluminum CONDUCTOR

SOLD BY PERMANENTE PRODUCTS COMPANY, KAISER BUILDING, OAKLAND 12, CALIFORNIA . . . WITH OFFICES IN:
Atlanta • Boston • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Houston • Indianapolis • Kansas City
Los Angeles • Milwaukee • Minneapolis • New York • Oakland • Philadelphia • Portland, Ore. • Seattle • Spokane • St. Louis • Wichita

Also available through General Electric Supply Corporation, Westinghouse Electric Supply Company, and Line Material Company.

OVERHEAD

Many transmission and overhead distribution connectors are available in the comprehensive Burndy connector line. All are compactly designed, install easily and quickly, provide efficient, high strength connections. Send for catalog, or ask for engineering assistance. BURNDY Engineering Company, New York 54, N. Y. WESTERN BRANCH: Vernon 11, California. CANADA: Canadian Line Materials, Ltd., Toronto 13.



SERVIT
Type KS

25 YEARS OF SERVICE

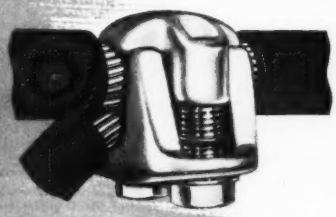
Connect with
BURNDY

FULL TENSION HYSPLICE
Type YDS

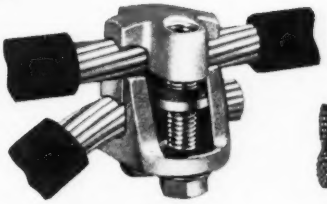
Hysplice . . . for loop or full tension service on copper and copperweld conductors. Rapid circular indent bonds the Hysplice (beryllium copper lined) to conductor for permanent, efficient connection. For ACSR too. All rapidly installed with compact, light-weight Burndy HYPRESSES.

SPLICIT
Type PS

Splicit provides two grips instead of one . . . a positive initial grip which holds securely until full tension is applied and full-tension gripping jaws take over. A positive splice every time. Smaller, lighter, more compact.



OKLIP
Type KVS



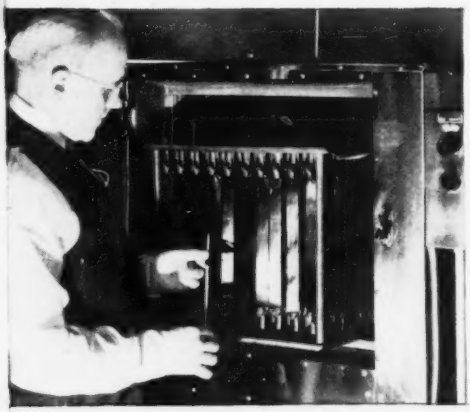
OKLIP
Type KVSU —
takes all combinations,
copper, aluminum, steel.

BUTTIN
Type KD

If you need but are cramped for space

Samples from each lot are tested for dielectric strength and are required to withstand 1000 volts per mil at room temperature.

Hot oil test. Varnished cambric is subjected to a severe heating test—hot petroleum at 150°C. for a period of 15 minutes. After cooling the varnished coating must not be softer nor more tacky than before immersion.



Precisely controlled ovens subject varnished cambric to aging tests far in excess of normal requirements.

The cambric tape is critically examined for gauge, thread count and tearing strength. Tensile strength lengthwise must not be less than 3000 psi.

more power —use American Varnished Cambric Cables

Maximum power, minimum size, lower costs and ease of installation—these are the chief advantages of U·S·S American Varnished Cambric Cables.

● How to get the most power from the smallest cable is a problem continually being faced by electrical engineers. The improved varnished cambric wires and cables offer a happy solution in many cases.

The varnished cambric used by American Steel & Wire Company is being recommended for operating temperatures up to 85°C. (185°F.). In this respect it is notably superior to rubber . . . permits greater current carrying capacity. It also has higher dielectric strength which results in cables of smaller outside diameter. In multiple conductor cables, part of the insulation may be applied in the form of a belt, thus reducing outside diameter still further. These features permit varnished cambric cables to carry substantially more power for their size than rubber insulated cables.

The fact that oil and grease do not damage varnished cambric insulation makes it widely used for motor and generator leads, transformers, regulators and oil circuit breakers. It is particularly desirable for heavy power lines in power plants, factories and mills.

With the protection of a lead sheath, (Type PS Strand Shielding used over 2KV) varnished cambric can be used where continuous exposure to moisture is expected. Combined with asbestos insulation, it can be used for extremely hot locations.

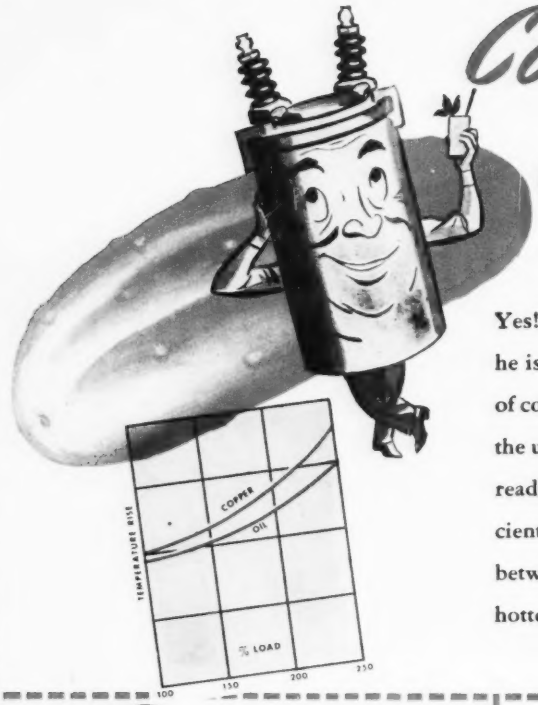
For complete information on the many types of U·S·S American Varnished Cambric Cables, write for our technical booklet.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS American Varnished Cambric Wire and Cable

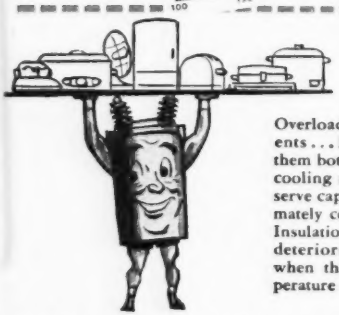
UNITED STATES STEEL

Cool as a CUCUMBER!



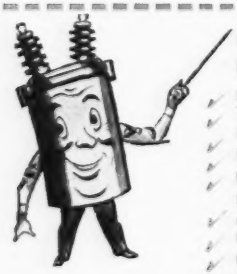
Yes! "Hi" HiperCore is cool as a cucumber, because he is designed to be cool. He is made with a core of cold-rolled, oriented silicon steel which permits the use of a smaller, narrower, and therefore more readily cooled coil. His numerous and more efficient cooling ducts provide greater contact area between the winding and the oil resulting in lower hottest-spot-over-oil temperature.

ME49-20



Overloads or High Ambients . . . HiperCores take them both in stride. Better cooling means greater reserve capacity for that ultimately certain emergency. Insulation materials in oil deteriorate more slowly when the operating temperature is reduced.

HiperCore Transformers will provide longer, trouble-free service than older style transformers. HiperCores have a longer life expectancy, thanks to advanced Surge-Tested Design and the use of a high factor-of-safety in the application of the insulating materials.

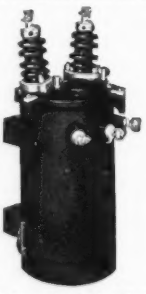


CHECK HIPERCORE PLUS FEATURES!

- Lower Hottest-Spot-Over-Oil Temperature
- Longer Operating Life
- High Factor-of-Safety in Design
- Lighter Weight
- Smaller Size
- Greater Short-Time Overload Capacity
- Better Voltage Regulation
- Superior Tap Changer

HiperCore

Photo shows 5 Kva, 7200 to 120/240 volts Conventional Type HiperCore Transformer. HiperCore Transformers range in size from 3 Kva to 50 Kva inclusive. Write for Bulletin H-303 for complete information about HiperCore Transformers.

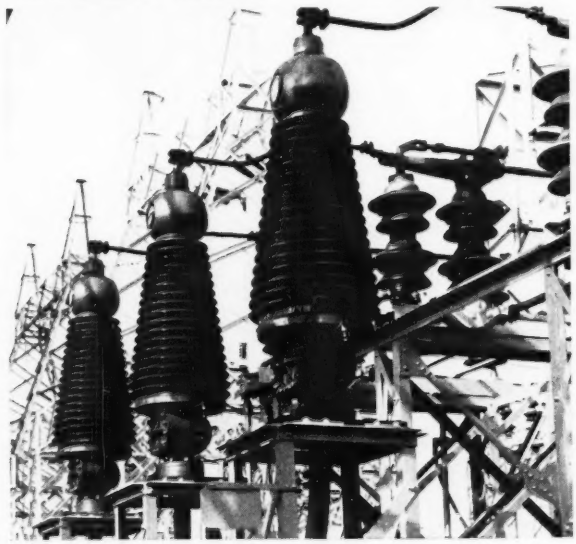


MOLONEY ELECTRIC COMPANY

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONTARIO, CANADA

OHIO BRASS COMPANY
BARBERTON DIVISION - BARBERTON, OHIO, U. S. A.

TO: THE OKONITE COMPANY
FOR: PHILADELPHIA ELECTRIC CO.



Add to the complex requirements of a high voltage bushing, the extra demands imposed by retaining oil at a constant pressure of 200 pounds, and you will appreciate the high degree of specialization involved in O-B Oilostatic Potheads.

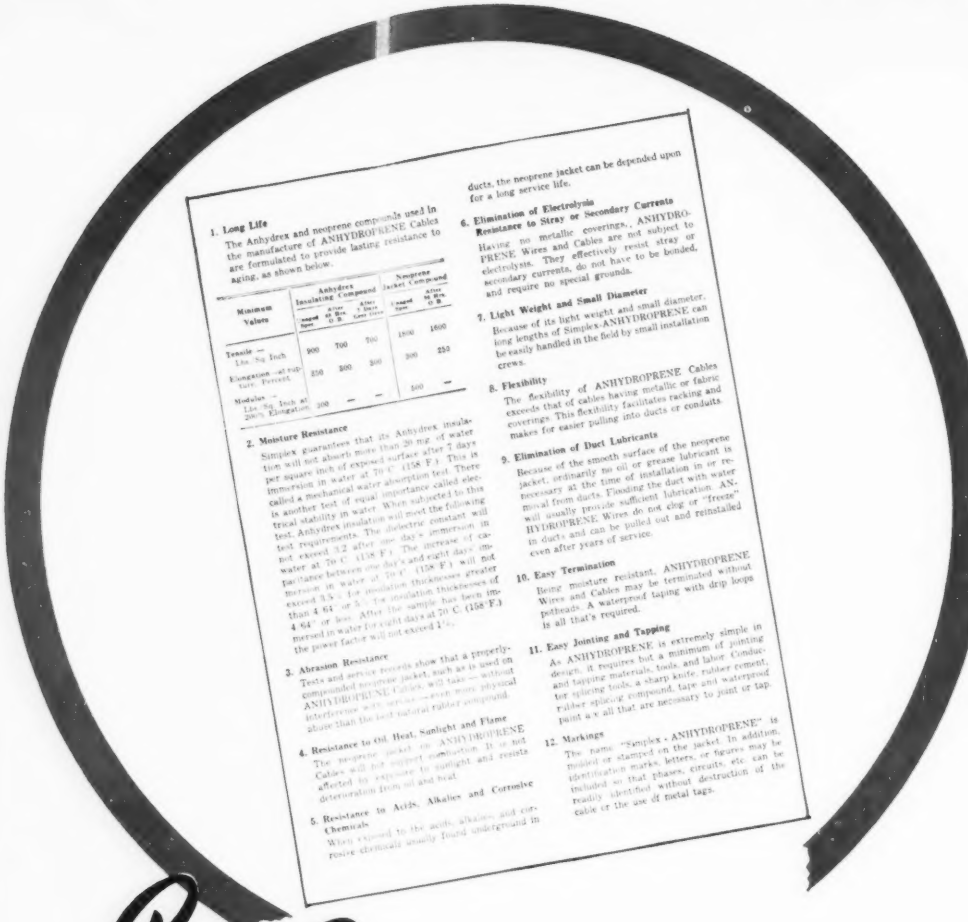
Shown here are two installations of these Potheads at opposite ends of a 9.25-mile circuit connecting the Southwark Generating Plant and Westmoreland Substation of Philadelphia Electric Company. Some of the characteristics of this installation are briefly described by the makers of Oilostatic cable, The Okonite Company.... "Voltage, 66 kv, 880 amperes, 105,000 kva rating. Load factor, 90 per cent. Three conductors in single 6⅝-inch pipe. Conductor size, 1,500,000 cir mils. Copper temperature, 75 degrees C. Insulation thickness, 0.35-in. And, equipped with..."

POTHEADS

AN ESSENTIAL PART OF OILOSTATIC CABLE

Ohio Brass **MANSFIELD, OHIO**

2959-M



1. **Long Life**
The Anhydrex and neoprene compounds used in the manufacture of ANHYDROPRENE Cables are formulated to provide lasting resistance to aging, as shown below.

Minimum Values	Anhydrex Insulating Compound			Neoprene Jacket Compound	
	Original Test	After 96 Hrs. @ 70° C.	After 7 Days Water Immersion	Original Test	After 96 Hrs. @ 70° C.
Tensile — Lbs. Sq. Inch	900	700	700	1800	1600
Elongation — at rupture, Percent	250	200	200	300	250
Modulus — Lbs. Sq. Inch at 200% Elongation	200	—	—	500	—

2. **Moisture Resistance**
Simplex guarantees that its Anhydrex insulation will not absorb more than 20 mg. of water per square inch of exposed surface after 7 days immersion in water at 70° C. (158° F.). This is called a mechanical water absorption test. There is another test of equal importance called electrical stability in water. When subjected to this test, Anhydrex insulation will meet the following test requirements. The dielectric constant will not exceed 3.2 after one day's immersion in water at 70° C. (158° F.). The increase of capacitance between one day's and eight days' immersion in water at 70° C. (158° F.) will not exceed 3.5% for insulation thicknesses greater than 4 64" or 5% for insulation thicknesses of 4 64" or less. After the sample has been immersed in water for eight days at 70° C. (158° F.) the power factor will not exceed 1%.

3. **Abrasion Resistance**
Tests and service records show that a properly-compounded neoprene jacket, such as is used on ANHYDROPRENE Cables, will take — without interference with service — even more physical abuse than the best natural rubber compound.

4. **Resistance to Oil, Heat, Sunlight and Flame**
The neoprene jacket on ANHYDROPRENE Cables will not support combustion. It is not affected by exposure to sunlight and resists deterioration from oil and heat.

5. **Resistance to Acids, Alkalies and Corrosive Chemicals**
When exposed to the acids, alkalies, and corrosive chemicals usually found underground in ducts, the neoprene jacket can be depended upon for a long service life.

6. **Elimination of Electrolysis Resistance to Stray or Secondary Currents**
Having no metallic coverings, ANHYDROPRENE Wires and Cables are not subject to electrolysis. They effectively resist stray or secondary currents, do not have to be bonded, and require no special grounds.

7. **Light Weight and Small Diameter**
Because of its light weight and small diameter, long lengths of Simplex-ANHYDROPRENE can be easily handled in the field by small installation crews.

8. **Flexibility**
The flexibility of ANHYDROPRENE Cables exceeds that of cables having metallic or fabric coverings. This flexibility facilitates racking and makes for easier pulling into ducts or conduits.

9. **Elimination of Duct Lubricants**
Because of the smooth surface of the neoprene jacket, ordinarily no oil or grease lubricant is necessary at the time of installation in or removal from ducts. Flooding the duct with water will usually provide sufficient lubrication. ANHYDROPRENE Wires do not clog or "freeze" in ducts and can be pulled out and reinstalled even after years of service.

10. **Easy Termination**
Being moisture resistant, ANHYDROPRENE Wires and Cables may be terminated without potheads. A waterproof taping with drip loops is all that's required.

11. **Easy Jointing and Tapping**
As ANHYDROPRENE is extremely simple in design, it requires but a minimum of jointing and tapping materials, tools, and labor. Conductor splicing tools, a sharp knife, rubber cement, rubber splicing compound, tape and waterproof paint are all that are necessary to joint or tap.

12. **Markings**
The name "Simplex - ANHYDROPRENE" is printed or stamped on the jacket. In addition, identification marks, letters, or figures may be included so that phases, circuits, etc. can be readily identified without destruction of the cable or the use of metal tags.

Page 2 of the new Simplex Bulletin 115 lists twelve big reasons why Simplex-ANHYDROPRENE Cables can be relied upon for low-cost installation, trouble-free service and long life. They are twelve of the many advantages these cables provide through the combination of Anhydrex insulation and a neoprene jacket.

Yet even they are only a part of the valuable information this bulletin contains. You ought to know about it for it shows the way to low-cost, thoroughly-dependable transmission and distribution systems.

If you're not up-to-date on ANHYDROPRENE Cables, or are not aware that a cable consisting only of conductor, insulation, and a thin jacket can provide the electrical stability, mechanical toughness, and versatility that efficient systems demand, it will pay you to read Bulletin 115. Why not drop us a line today for your copy?

Simplex—WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

A New 100-AMPERE Type GR Recloser...

For Rural and Suburban Distribution

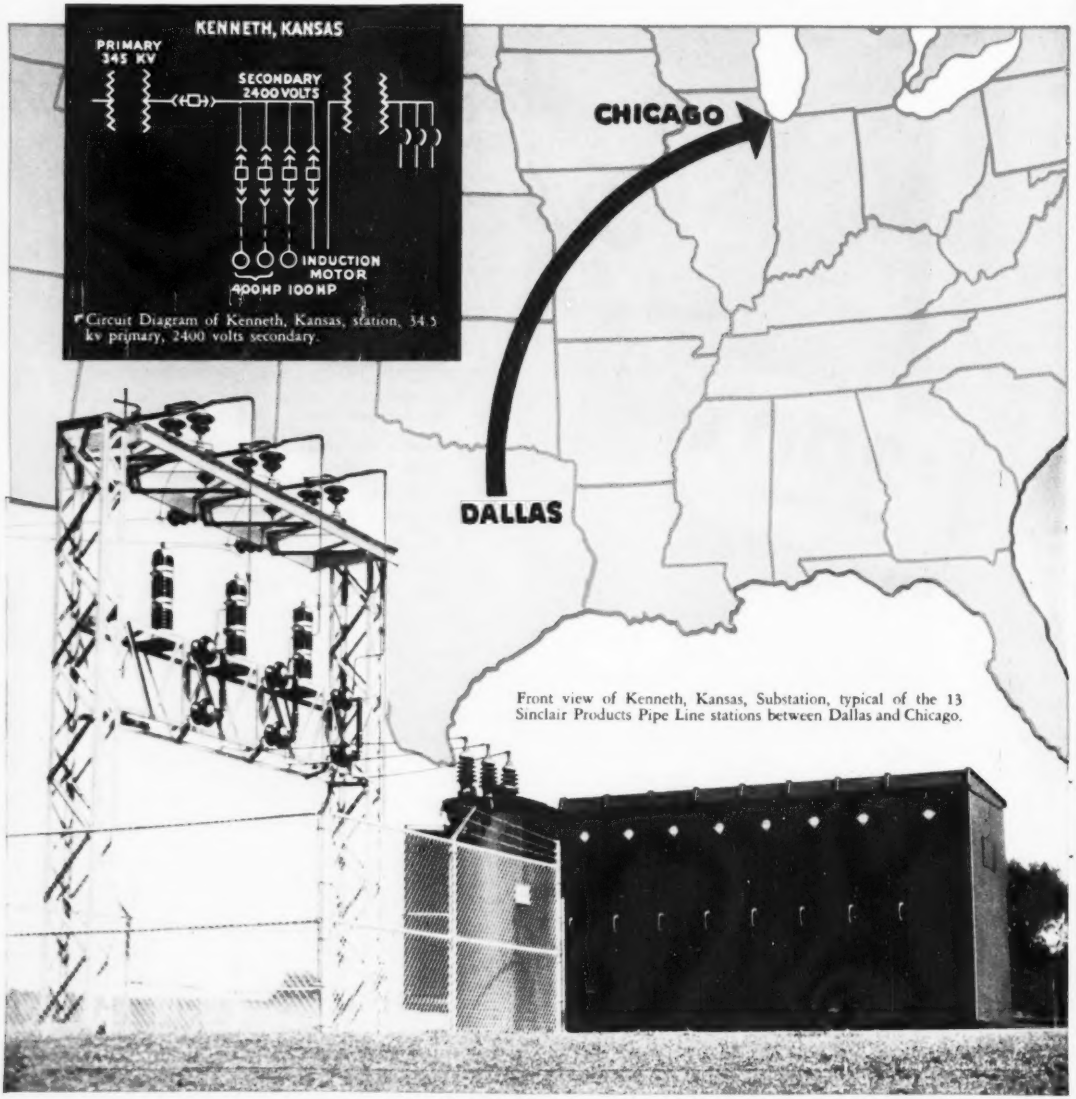
- 100 amperes—continuous current rating
- 2,000-2,500 amperes—interrupting rating
- Full 15-kv insulation (110-kv impulse withstand)
- Interrupts 2,000 amperes with full 15 kv across one pole
- Heavy top casting and deep-drawn tank—both heavily hot-dip galvanized
- *One* fast, and *three* time-delay openings, or *four* time-delay openings
- Bushings, mechanism, hangers—all interchangeable with 50-ampere series
- Five coil sizes available—25, 35, 50, 70, 100

The 100-ampere GR Recloser is available for immediate delivery now. Use it to provide complete, economical protection for your rural *and suburban* lines. For complete information, ask your Westinghouse representative or distributor for Bulletin B-4339, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60721

Westinghouse
GR RECLOSERS

ALLIS-CHALMERS
Sinclair Pipe Line

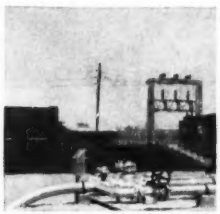
Circuit Diagram of Kenneth, Kansas, station, 34.5 kv primary, 2400 volts secondary.



Front view of Kenneth, Kansas, Substation, typical of the 13 Sinclair Products Pipe Line stations between Dallas and Chicago.

Switchgear Protects from Dallas to Chicago

45 Outdoor Switchgear Units with Ruptair Circuit Breakers and 28 Type "H" Auxiliary Units Provide Power Protection On the Sinclair All-Electrified Products Pipe Line



View of Control House and Substation at Kenneth, Kan.

FINISHED petroleum products flow north and east from Texas refineries to Illinois in the all-electrified Sinclair Refining Company Products pipe line. Electric power for the entire system is protected by Allis-Chalmers switchgear.

Through this unusual transportation line, many different grades of petroleum products flow simultaneously at approximately 4 m.p.h. Precise timing, possible through continuous electric power and precision-timed clocks, permits drawing off any petroleum product at each of the 13 stations. Reversal of pumping power reverses the flow of petroleum products.

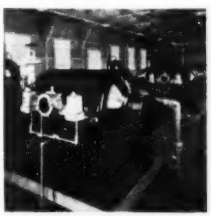
Any power failure on the 1500 mile pipe line means loss of timing and slackening of petroleum supply. Reliable, standardized Allis-Chalmers switchgear units stand guard to protect power supply and equipment.

These Allis-Chalmers switchgear units are equipped with 50 mva interrupting capacity, *Ruptair* circuit breakers, thermal overload and undervoltage relays. Switchgear and Allis-Chalmers OISC transformers form unit substations that provide remote control starting and stopping of motor driven pumps.

All steel-enclosed outdoor housings are completely weather proof. Each unit is operationally safe and complete with interlocks and grounded, all-steel compartments. Standard design of the prefabricated units means that a pipe line operator familiar with one station would be familiar with all of them.

* * *

For better control and protection of electrical equipment, utilities and industries are turning to Allis-Chalmers switchgear. It provides the sure answer to their power protection problems.



400 HP 3600 RPM AZZ motors installed at the Arlington Station of Sinclair's Products Pipe Line.

Allis-Chalmers switchgear is prefabricated, easy to install, safety-engineered. It is delivered ready to operate, complete with mechanically trip-free breakers. These features and others give you the most economical power protection. Call your nearby Allis-Chalmers Sales office or write direct. *Ruptair* is an Allis-Chalmers trademark.

A-2813

ALLIS-CHALMERS, 939A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

First in the U.S. with Metal-Clad Switchgear

what's **New** in street lighting

Now every single film cutout individually tested

Ever install a new film cutout and find it shorted when the current went on? You probably have, if you operate series street-lighting circuits. And if your experience is like most, the short in that 3½¢ cutout cost you many dollars to correct.

TO SAVE YOU MONEY

Now General Electric has developed, and installed in its production line, an automatic tester which actually tests each film cutout for shorts and insulation values — individually — before it is packaged.

Starting with cutouts that are known for the accuracy of breakdown, that are obtainable in the right rating for the right lamp, and that are designed to operate under high temperature and pressure conditions, G.E. has produced even a better film cutout without any increase in price.

Individually tested film cutouts are another example of General Electric's policy — making the best, first. Next time you order cutouts, specify General Electric and save yourself time and money. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

AVAILABLE SOON

. . . reserve your copy now

BTC's new catalog of Drop Forged Hi-Line Hardware will soon be coming off the press. The first edition to appear since the war, it contains valuable information you'll want to have on hand for ready reference—pictures, blueprints and complete specifications on BTC's entire line of Drop Forged Steel, Aluminum and Bronze Hi-Line Hardware.

This 40-page BTC catalog will be sent to you without charge by the company that pioneered the first and only full line of standard drop forged high-line hardware. Simply fill in and mail the coupon below — but do it now, so that your copy can be mailed when it's ready.

THE BREWER-TITCHENER CORPORATION
CORTLAND, NEW YORK
Metal Products Manufacturers for over 100 Years

THE BREWER-TITCHENER CORPORATION
CORTLAND, NEW YORK

Please reserve my copy of the new BTC hi-line hardware catalog.

NAME _____ TITLE _____

COMPANY _____

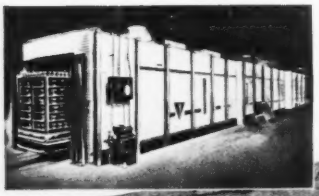
STREET _____

CITY _____ ZONE _____ STATE _____

Craftsmanship and Modern Engineering

Result in

VICTOR'S Steady Growth



Kiln No. 4 Completed in 1949

Modernized VICTOR plant with over 300,000 sq. ft. of manufacturing space.

VICTOR'S skilled craftsmen, many of whom have been making high quality insulators at Victor for over forty years, take *pride* in their workmanship. It is this pride, *plus* modern ceramic and electrical engineering, *plus* advanced manufacturing equipment that have brought about Victor's steady growth.

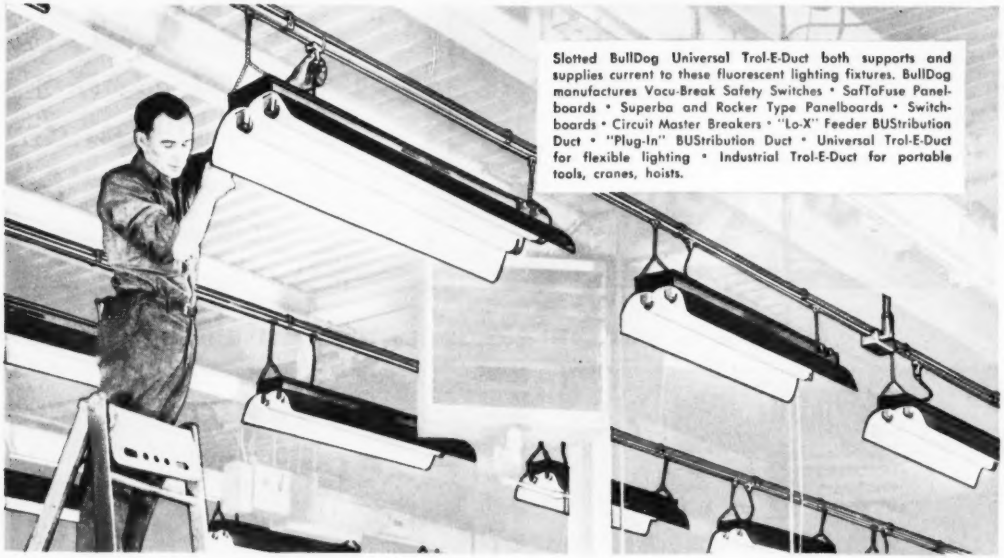
The addition of another oil-fired tunnel kiln early this year has enabled Victor to step up the production of its high voltage porcelain insulators—insulators famous for their superior, *on-the-job performance*. And with its large modern factory, Victor is now better equipped than ever to fill your standard or special porcelain requirements.

Specify VICTOR for quality and dependable deliveries.

VICTOR
INSULATORS Inc.
VICTOR, NEW YORK

Look for this trade mark of enduring service

V



Slotted BullDog Universal Trol-E-Duct both supports and supplies current to these fluorescent lighting fixtures. BullDog manufactures Vacu-Break Safety Switches • SafToFuse Panelboards • Superba and Rocker Type Panelboards • Switchboards • Circuit Master Breakers • "Lo-X" Feeder BUStribution Duct • "Plug-In" BUStribution Duct • Universal Trol-E-Duct for flexible lighting • Industrial Trol-E-Duct for portable tools, cranes, hoists.

Spot your lighting with a slot

TIRED of rewiring the whole plant every time you move or add a lighting fixture?

Let the continuous outlet *slot* of BullDog Universal Trol-E-Duct spot your lighting fixtures where you want them.

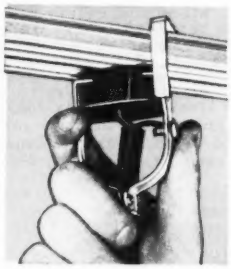
Universal Trol-E-Duct gives truly *flexible* lighting. Trol-E-Duct's slot makes it possible to add, remove or change lighting fixtures at will . . . without rewiring.

Twist-out plugs or trolleys tap current from the slotted opening which runs the full length of the Trol-E-Duct. They can be quickly attached or removed without disconnecting the current.

Prefabricated and standardized, Universal Trol-E-Duct is made in lengths from one to ten feet. It can be dismantled and reinstalled at any time, without scrapping a single part. Systems can be easily expanded by adding standard sections and fittings. Capacity: 50 Amps., 250 Volts, Single Phase.

Call in your BullDog Field Engineer for more information on this modern lighting system. He will be glad to show you a typical installation nearby.

For a mobile light source, use a trolley outlet. Easily inserted at a Trolley Entrance Coupling. Metal wheels roll smoothly astride duct slot. Contacts are in constant touch with bus bars as trolley moves.



Inserting a twist-out plug in Universal Trol-E-Duct is easy! Simply insert plug contacts in slotted opening of duct and give plug a quarter-turn. "L" supports lock plug firmly in place.

BullDog Field Engineers welcome the opportunity to sit in with you during the early planning stages of a building project. Their knowledge of electrical distribution layout can mean savings in installation costs, as well as efficiency and reliability in actual operation. Why not take advantage of this service?

BULLDOG ELECTRIC PRODUCTS COMPANY

DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES

IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO

BULLDOG

HEADQUARTERS FOR ELECTRICAL DISTRIBUTION

CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

Coast Electric & Manufacturing Co.
1720 N.E. Sixth Avenue Tel. Garfield 2844
Portland 12, Oregon

Safety Switchboard Company
1445 Stevenson St. Tel. Hemlock 1-2470
San Francisco 3, Calif.

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street Tel. Logan 5-5331
Los Angeles 11, Calif.

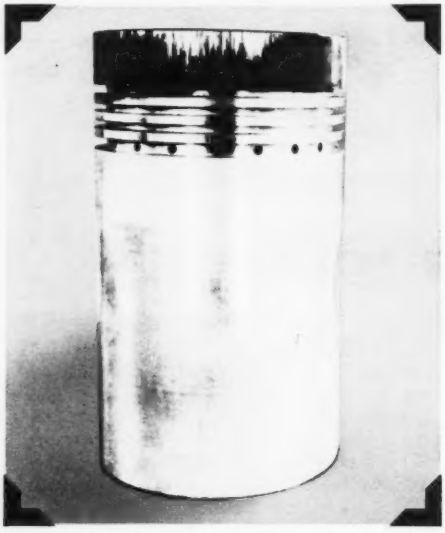
STANDARD ENGINEER'S REPORT

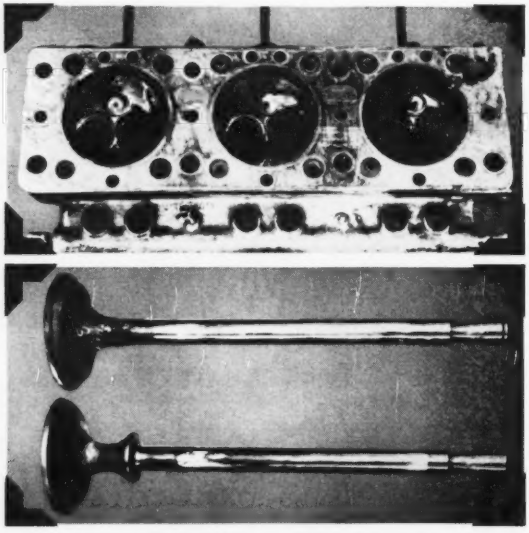
RPM DELO

TEST DATA

LUBRICANT	RPM Delo Supercharged Lub. Oil
UNIT	Caterpillar Diesel - D13000 5¾×8"
CONDITIONS	Cont. high load - Pumping water
FUEL	Regular commercial Diesel fuel
TEST PERIOD	4 Months
LOCATION	Coolidge, Arizona

CYLINDER WEAR REDUCED 75% BY NEW LUBRICATING OIL





RPM DELO SUPERCHARGED LUBRICATING OIL held cylinder wear to 0.0007 inches per 1000 hours in a stationary Diesel where ordinary heavy-duty type oil had allowed over four times more wear, or 0.0031 inches. The piston, head, and valves above, photographed after they had operated in the engine 965 hours under severely accelerated conditions on RPM DELO Supercharged, are typical of the excellent condition of parts and cleanliness maintained throughout the engine by this newly developed oil. All piston skirts were varnish-free, all oil-return holes open. Average ring-gap increase per 1000 hours was reduced from 0.01625 inches to 0.00350 by the use of RPM DELO Supercharged Lubricating Oil.

REMARKS: This new product in the RPM DELO line is specially compounded to solve ring-sticking, deposit formation, and excessive wear problems in Diesel engines operating in extra hard service. Many field tests have proved it to be particularly valuable where continuous high loads or high-sulphur content Diesel Fuels cause these conditions.

In the test reported here, the engine ran the full 965 hours at approximately 90% of governed full load engine rating. Drain periods were extended to 240 hours, however all 24 piston rings remained free, no troublesome deposits formed in the ring belt or on other parts, and oil compound depletion was negligible.

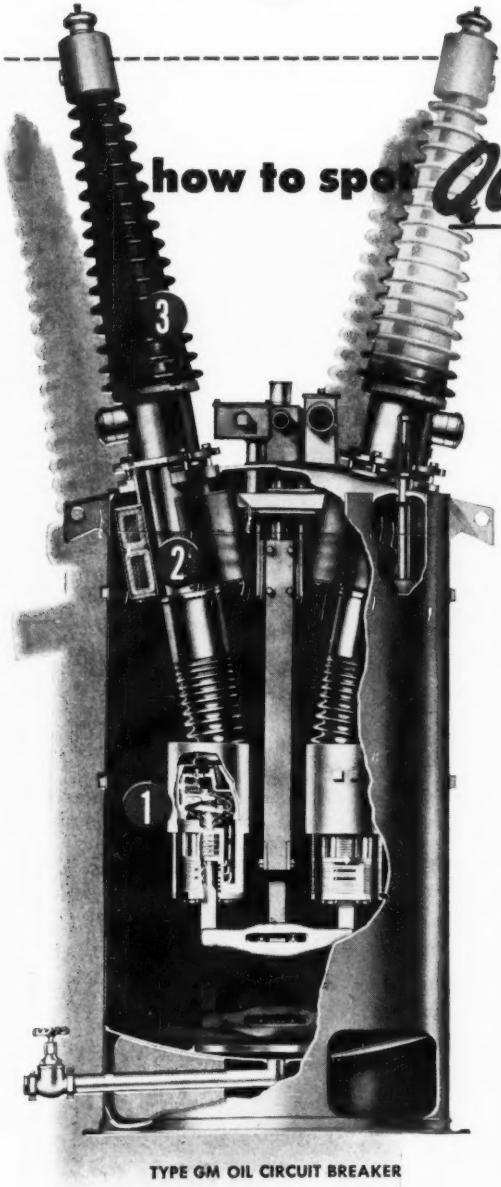
Besides providing unusual resistance to oxidation, the compounds in RPM DELO Supercharged Lubricating Oil clean existing gum and lacquer from parts, prevent internal rusting and bearing corrosion and stop oil foaming.

STANDARD TECHNICAL SERVICE checked and reported this test. If you have a lubrication or fuel problem, your Standard Fuel and Lubricant Engineer or Representative will give you expert help; or write Standard of California, 225 Bush Street, San Francisco 20.

STANDARD OIL COMPANY OF CALIFORNIA • San Francisco
THE CALIFORNIA OIL COMPANY • Barber, N.J., Chicago, New Orleans
STANDARD OIL COMPANY OF TEXAS • El Paso, Texas
THE CALIFORNIA COMPANY • Denver, Colorado

YOU CAN BE **SURE**.. IF IT'S

Westinghouse



TYPE GM OIL CIRCUIT BREAKER

how to spot QUALITY in a power circuit breaker

Here is the inside story of speedy, reliable circuit breaker operation. It's the reason why Westinghouse Type GM Circuit Breakers provide shorter arcing time, reduced arc energy, lower maintenance, longer life.

1. Multi-flow "De-ion" grids provide efficient arc interruption. Pressure generated in short, upper arc drives oil to extinguish lower arc—quickly.
2. Bushing-type current transformers, or linear couplers, provide reliable relaying and bus differential protection—with no additional space requirements.
3. Type "O" condenser bushings combine high mechanical, electrical and thermal strength. Complete impregnation and uniform voltage distribution insure extremely low losses.

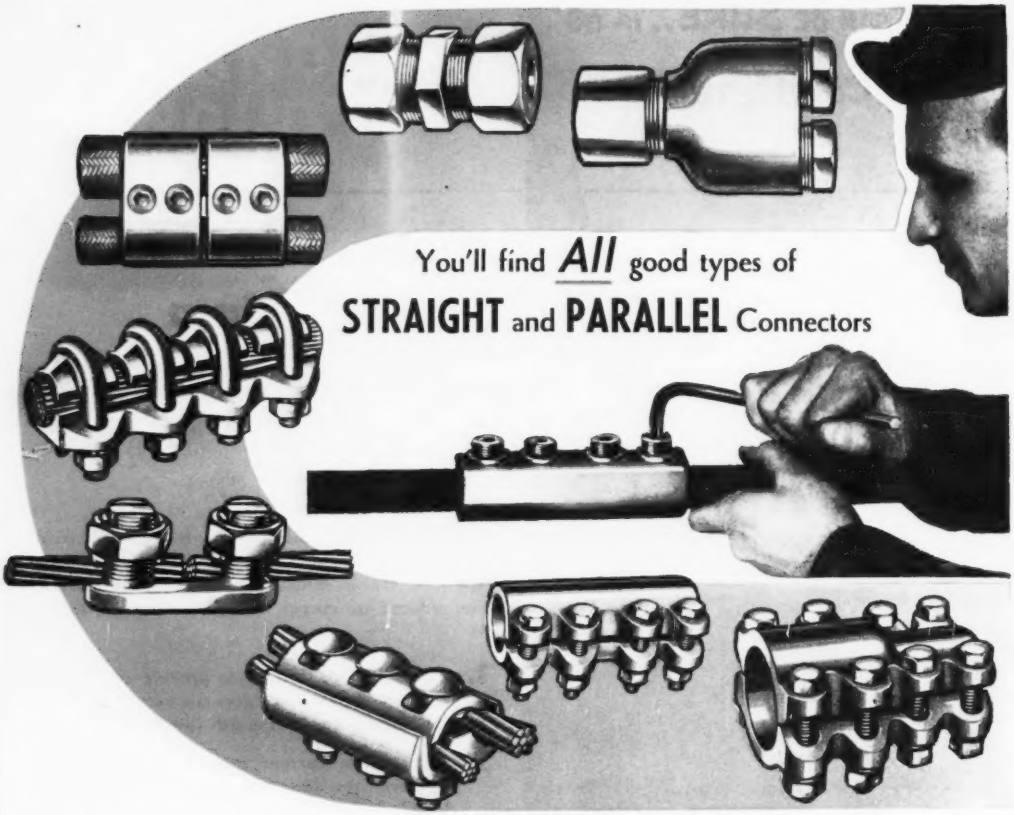
These are a few of the reasons why you'll get better service continuity and greater system stability with the Westinghouse Type GM Oil Circuit Breaker. Ask your near-by Westinghouse representative for complete details and booklet B-4012. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-60712

Westinghouse

POWER CIRCUIT BREAKERS

Made in the WEST... for the WEST



in the *Complete* line

Yes, it's mighty handy to open your Penn-Union Catalog and pick the exact type you need. They're all there—in a complete range of sizes: Bolted straight connectors . . . screw type . . . various split sleeve types . . . shrink fit . . . universal clamps . . . E-Z connectors with yoke and nut, etc.

The Penn-Union Catalog also gives you the *complete* line of Service Connectors, Tees, Cable Taps, Grounding Connectors, Lugs, Power Connectors, etc.

Preferred by leading users—who have found that *"Penn-Union" on a fitting is their best guarantee of unfailing service.*

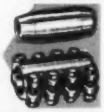
Kenneth Anderson Co.
412 Seaton St.
Los Angeles

Northwestern Agencies
4130 First Ave. South
Seattle, Washington

F. M. Nicholas Co.
1123 Harrison St.
San Francisco

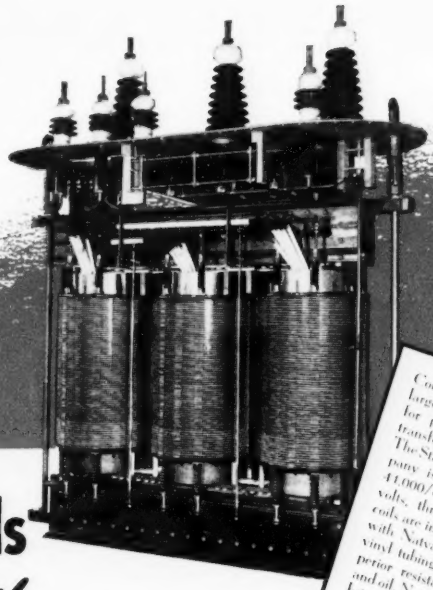
PENN-UNION ELECTRIC CORPORATION, ERIE, PA.

THE *Complete* LINE OF CONDUCTOR FITTINGS



PENN-UNION

The Standard Transformer Company Insulates and Protects Transformer Leads and Coils *with* NATVAR 400

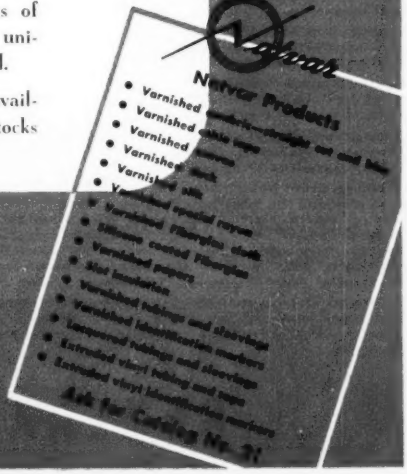


Core and coil assembly of a large power transformer ready for placing in its tank. This transformer, manufactured by The Standard Transformer Company is rated at 5000 KVA, 44,000/66,000 to 7333/16,000 volts, three phase. Leads and coils are insulated and protected with Natvar 400, the extruded vinyl tubing and tape with superior resistance to both heat and oil. Natvar Varnished Cambric and Natvar Cable Tape are also used in Standard transformers.

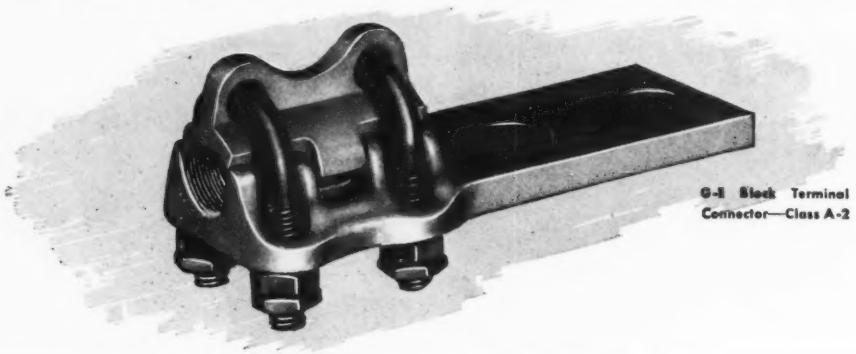
The Standard Transformer Company, Warren, Ohio, uses only high grade insulating materials in the transformers they build because they know how much these materials contribute to their performance —their long life, dependability, and surge proof qualities.

Natvar 400, approved for continuous operating temperatures of 105°C., gives lasting insulation and protection because of its uniformly superior resistance both to high temperatures and to oil.

Natvar 400 and other Natvar flexible electrical insulations are available for immediate delivery, either from your wholesaler's stocks or from our own.


Natvar Products
Varnished
Varnished
Varnished

This General Electric power connector can simplify your inventory by 63% to 83%



G-E Block Terminal Connector—Class A-2

Five General Electric power connectors of the type shown above will handle *all* the 22 conductor sizes listed in the table*. Compare this feature with other brands that usually *require a different connector for each conductor size.* You'll immediately realize how much G-E connectors can cut your stock costs by reducing the number of connectors required.

Here are other ways you can SAVE by using G-E connectors.

SAVE TIME— No more stock room safaris hunting for odd-size connectors. When you stock General Electric connectors, you stock fewer connectors. Also, you save time in ordering—you don't have to search through bulky catalogs looking for connectors that are seldom used and are a nuisance to order, besides taking up valuable stock space. G-E connectors are easy to order for the simple reason that you don't have to order so many varieties.

SAVE SPACE— Less stock room space required when you use G-E connectors because fewer connectors are needed to take care of the same range of conductor sizes that you're using now.

SAVE MONEY— When you use G-E connectors you reduce stock storage costs, and you save valuable time in ordering.

CHECK THESE ADDITIONAL FEATURES OF GENERAL ELECTRIC CONNECTORS

SILVER CONTACT SURFACES are a *standard* feature on *all* G-E connectors for use with copper conductors—at no extra cost. This eliminates oxidation problems, assures lower contact losses and longer life.

SERRATED CONTACT SURFACES give extremely high pull-out strength and a permanent, high-conductivity joint that will resist vibration and give positive pressure on the cable at all times.

NON-CORRODIBLE HARDWARE is of high-strength bronze alloy that gives tight and trouble-free service. G-E connectors will not twist, distort, or season crack.

INTERLOCKING SIDES confine the strands of the cable within the conductor enclosure, thus obtaining full advantage of the cable's current-carrying capacity.

Place an order today with your G-E sales representative and start realizing the many benefits to be gained by using this new line of General Electric connectors. Also, write for a copy of bulletin GEC-400 that contains 38 pages of valuable information on these new connectors, and see for yourself how easy they are to order. Write to *Apparatus Department, Section J 856-51, General Electric Company, Schenectady 5, New York.*

*General Electric connectors come in a wide range of sizes and types—straight, tee, block, angle, parallel, expansion, ground, and many others. See bulletin GEC-400 for the complete line.

Conductor size	General Electric Catalog No.	Connector Mfg. A	Connector Mfg. B	Connector Mfg. C	Connector Mfg. D
1/0	6151174-9 One G-E connector replaces 6, stock is reduced 83⅓%	√	\	√	√
2/0		√	\	\	√
3/0		√	\	\	√
4/0		√	\	\	√
250		√	\	\	√
300	↓	√	\	\	√
350	↑	√	\	\	√
400		√	None	\	None
500	6151174-59	√	\	\	√
600		None	None	\	\
½ IPS	↓	√	None	\	\
700	↑	None	None	\	None
750		None	None	\	\
800	6151174-88	None	None	\	\
1000		None	None	\	\
3/4 IPS	↓	√	\	\	\
1250	6151174-118 One G-E connector replaces 3, stock is reduced 66⅔%	None	None	\	\
1500		None	None	\	√
1 IPS		None	None	\	\
1750	↑	None	None	\	\
2000	6151174-148	None	None	\	\
1¼ IPS	↓	None	None	None	\
Only 5 G-E connectors for ALL 22 conductor sizes		11 connectors for 11 cond. sizes. No connectors available for 11 conductor sizes	9 connectors for 9 cond. sizes. No connectors available for 11 conductor sizes	21 different connectors for 21 cond. sizes	20 different connectors for 20 cond. sizes

√ Indicates a different connector.

GENERAL ELECTRIC

856-51

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

SPECIFY

RoMarine - RoPrene and RoZone* - RoPrene

FOR AIRPORT WIRING

***The* Cables Approved by Civil Aeronautics Administration under Specification L-824**
Type A—Style RR • Type B—Style ROR

Single and multiple conductor for 600, 3000 and 5000 volt service.

*TRADEMARK REGISTERED

These cables are now listed by CAA in its "List of Approved Airport Lighting Equipment" as complying in all respects to CAA standards for underground electrical cables for airport lighting circuits. RoMarine-RoPrene is approved as Type A—Style RR for 600, 3000, and 5000 volts, while RoZone-RoPrene is approved as Type B—Style ROR for 3000 and 5000 volt service. Approval covers single and multiple conductor constructions in all sizes described by Specification L-824.

An announced airport building and improvement program involving close to a billion dollars, means real business for electrical wholesaler and contractor, alike. Get in on the ground floor . . . get your share of this business with RoMarine-RoPrene and RoZone-RoPrene . . . the *first* cables to be approved by CAA for airport lighting and control circuits.

WRITE FOR DESCRIPTIVE SPECIFICATIONS RR-1 AND RO-4.

FOR PRICE AND DELIVERY INFORMATION CONTACT NEAREST ROME CABLE OFFICE

Seattle 4, Wash. . . . 3404 Fourth Ave., South
San Francisco 3, Calif. . . . . 1045 Bryant St.
Los Angeles 21, Calif. . . . . 2038 Bay St.
Denver 3, Colo. . . . . 1160 Elati St.
Salt Lake City 1, Utah
462 Union Pacific Annex Bldg.

It costs less to buy the best . . .
buy Rome Cable

ROME CABLE
Corporation
ROME • NEW YORK
From Bar to Finished Wire

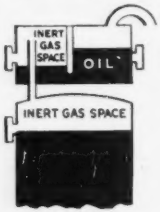
ROME CABLE ROME, N.Y.

Four Reasons for

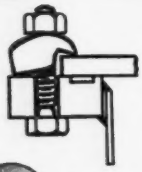
TWO WAYS to increase the return on your transformer investment are to reduce rate of depreciation and trim maintenance costs. These objectives are accomplished in Allis-Chalmers power transformers with features like those below. These four features, when added together over the life span of the transformer, can make a *big difference* in your power transformer operating costs. Here's why:

1 SIMPLE, POSITIVE OIL PROTECTION

Oil-Sealed Inert Gas oil protection, introduced by Allis-Chalmers, operates practically without attention. No replenishment of gas containers necessary. Low pressure system (not over 1 lb per sq in.) extends gasket life. Effective oxygen, moisture seal eliminates sludge and acid formation in transformer oil.



2 LONGER GASKET LIFE



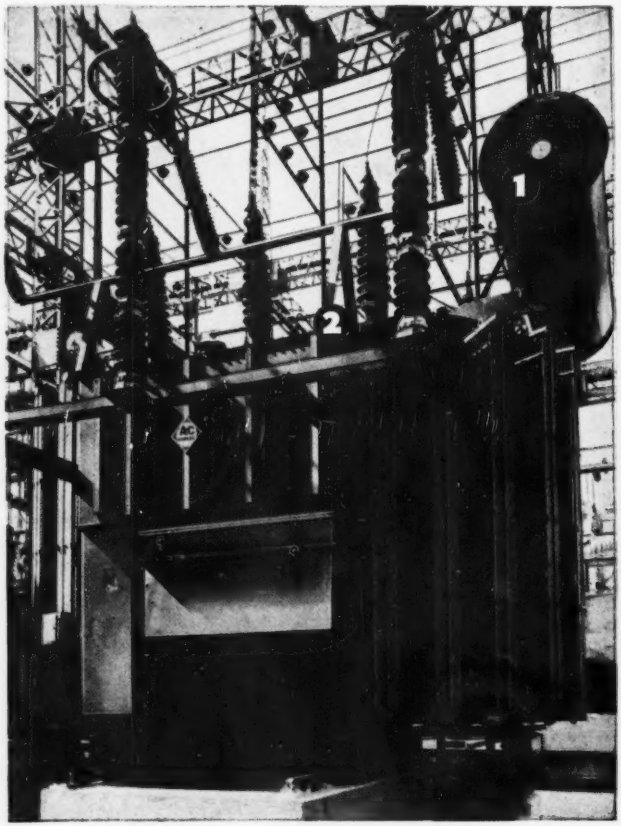
A seemingly small detail like gasketed seals quickly assumes great importance when they fail to function properly and costly maintenance is required. On Allis-Chalmers power transformers, maximum gasket life and effectiveness are *assured* through metal-to-metal controlled gasket compression.

3 LOW UPKEEP FOR RADIATORS

Radiators are rigidly braced, grooved for added strength. Surface is protected with bonderized coating, followed by two coats of high quality outdoor paint. When repainting is desired, the job is made easier because radiators have staggered cooling fins.

4 SIDE OPERATED TAP CHANGER

It's easier, and takes less time to change taps with Allis-Chalmers No Load Tap changer because of its side-of-tank location. There's no danger of coming in contact with high voltage overhead system. Tap positions are easily read from ground level.



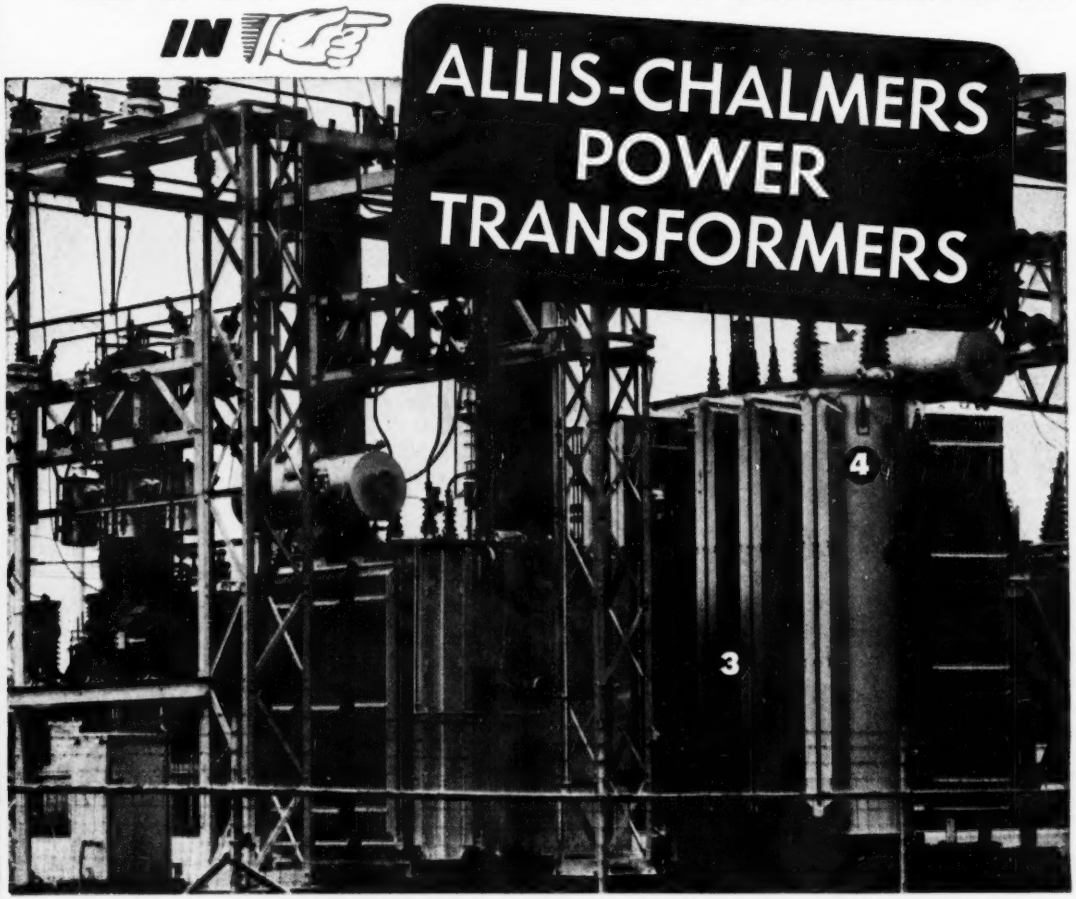
INTERCONNECTING three systems at a large Indiana substation, this transformer is rated 24,000/30,000 kva, 3 phase, 138-69-34.5 kv. Since its installation in 1945, two duplicate units have been ordered. Typical Allis-Chalmers low-maintenance construction includes the four features at left.

ALLIS

Pioneers in Power

Low Maintenance

IN



ALLIS-CHALMERS TRANSFORMER and regulator work together, serving an important load in Louisiana oil producing area. Transformer is equipped with four 2½% full capacity taps below normal — regulator supplies ±10% regulation in ⅝% steps.

Again, *Oil-Sealed* Inert Gas Protection and other features at left are a part of the Allis-Chalmers low-maintenance design.

For details on Allis-Chalmers quality transformer construction, contact your nearby A-C sales representative. Or write direct.

A-2852

ALLIS-CHALMERS, 939A SO. 70 ST
MILWAUKEE, WIS.

Oil-Sealed is an Allis-Chalmers trademark.

CHALMERS

A-C ALLIS-CHALMERS

and Electrical Equipment from Generation through Utilization

Get your Free INDENTER

Cross Section Showing Indentations.

Here is your chance to get a free Briegel Indenter — the tool that saves more time installing thin wall tubing than anything else on the market. This Special Package Offer is made up of 400 1/2" Briegel Connectors and 200 1/2" Briegel Couplings — enough to wire three average six room houses — and One Original Briegel Indenter all for the price of the fittings alone.

The Briegel Method of installing thin wall is not only faster and less expensive but also neater in appearance and more permanent.

Cash in on this free offer while it lasts. Save time and save money on your original purchase and on the job with Briegel Fittings!

This offer available at all leading wholesalers.

All B-M Fittings Carry the Underwriters' Seal of Approval

This offer subject to withdrawal without notice

Insist on Briegel All-Steel Approved Couplings and Connectors. These are the Original Labor-Saving Indenter Type Fittings used by contractors for over 15 years.

BRIEGEL METHOD TOOL CO.

GALVA • ILLINOIS

Another achievement of Shell Research—

SHELL DIALA OIL A·X

a revolutionary transformer oil that gives 50-year service

We went into the problem of oil oxidation

We studied how, under heavy load conditions in transformers, both heat and oxygen could change an oil chemically . . . cause sludge, acidic deterioration products and peroxides. These are the impurities which reduce cooling efficiency . . . damage cloth insulation . . . ultimately corrode exposed copper and iron surfaces. Until our study, there wasn't much you could do about it except to spend money on oil changes and transformer overhaul, or invest in expensive oil protection devices such as conservators.

Shell Diala Oil AX was developed to step costs down

We examined Shell Diala Oil AX against all competitive oils on the market, comparing rates of oxygen absorption at high temperatures as well as more commonly measured properties. Even our top research men were surprised when Shell Diala Oil AX resisted oxidation *140 times longer* than the next best transformer oil. Judging by these accelerated tests, Shell Diala Oil AX *can last better than 50 years in even an open, air-breathing transformer.* That means money saved and then some!

And that isn't all—

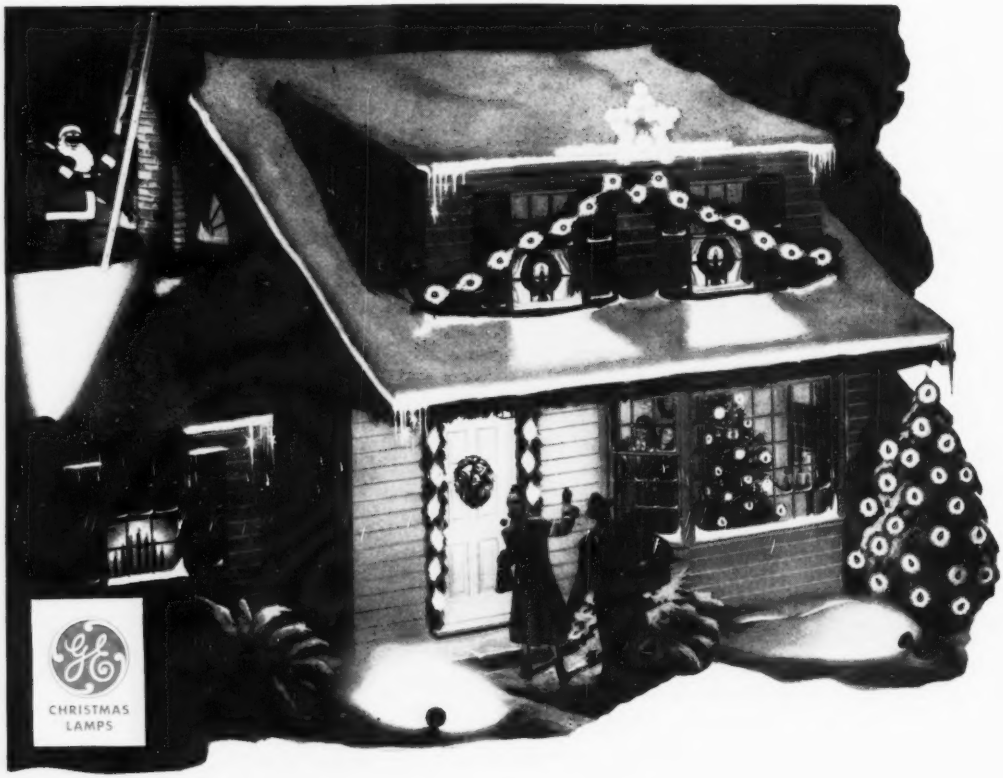
Further tests proved that Shell Diala Oil AX, in addition to its remarkable oxidation resistance, possesses all other properties required of superior transformer oil . . . excellent thermal transfer, a dielectric strength above 30,000 volts . . . a very low pour point . . . minimum volatility . . . up to 37% less fabric deterioration. And it is equally effective for oil-filled switches. Ask your Shell representative where and how it can help you.

ARE YOU ABSOLUTELY SURE YOU ARE GETTING ALL THAT'S NEW IN LUBRICATION?

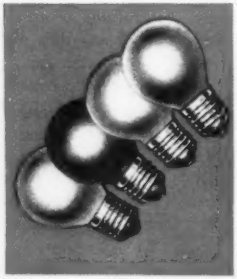
Your Shell Lubrication Engineer can make a complete study and analysis of your plant and machines . . . give you engineering counsel, advice on new lubricants and their application . . . help you set up schedules and controls for each and every machine. For that kind of service — call in your Shell Lubrication Engineer.

SHELL

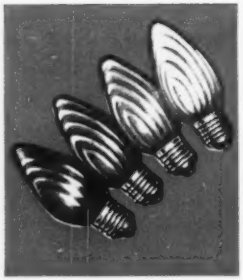
This year it's Christmas lighting



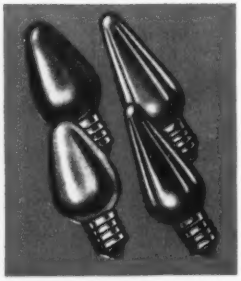
FOR FLOODLIGHTING—G-E PAR-38 projector lamps.



GENERAL ELECTRIC TYPE S-11, 10 watts, for outdoor decoration.



POPULAR TYPE C-9½ outdoor type Christmas tree lamps.



G-E CHRISTMAS TREE LAMPS—Series Type C-6, Multiple Type C-7½.

All these lamps to be promoted for

for indoors and out . . . another GREAT G-E PROMOTION that helps build lighting load!

THIS year we're selling Christmas lamps by the houseful—for complete home decoration, inside and out . . . all the different types you see below!

Everybody likes to dress up the house for Christmas and this year we're showing 'em how in a big way! Heading the promotion is a big, double-page full color advertisement in the November 26 Saturday Evening Post. It's filled with ideas on Christmas lighting that will make your customers want to buy lamps and Christmas lighting fixtures as they've never bought before.

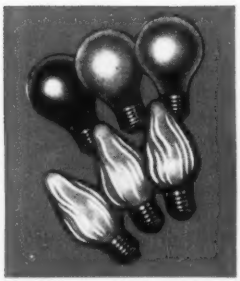
To help retailers cash in, there's a special display package packed with colorful sales helps.

It's going to be the greatest Christmas lighting season ever—and that means bonus revenue for you in increased holiday lighting load! By adding your own promotional efforts to General Electric's, it can be bigger yet.

This year make your house say
Merry Christmas with Lights
MAKE IT A Bright Christmas WITH G-E BULBS
G-E COLORED AND DECORATIVE LAMPS
G-E PROJECTOR
FLOODLAMP
GENERAL ELECTRIC

Above are window streamer, 2-page Post ad, 1-page Life ad, and two counter displays.

GENERAL ELECTRIC



STANDARD BASE DECORATIVE—Type A-19 and Type F (flame shape).

G-E HOUSEHOLD LAMPS in the new 4-lamp package—sells four lamps instead of one!

Merry Christmas
General Electric
Sun and Heat lamps
Perfect gifts for under the tree!
G-E Sunlamps give that glowing summertan look all year 'round. Only $8.50
G-E Heat Lamps soothe muscular aches and pains. Hard glass model with red filter $2.95

holiday lighting!

A New Slimline Lighting "Element"

the DIRECTOR

by Smithcraft

AN "AREA-OF-LIGHT" SOURCE

Director, by Smithcraft, is a louvered fluorescent lighting "element" . . . an extensive, yet unobtrusive, "area-of-light" source, which effectively develops the advantages of the new 75-watt instant-start T-12 8-foot lamp. Director is available for two, three, four and six T-12 96" 75-watt lamps; two, three, four and six T-8 96" Slimline lamps; and, in matching units, for two, four and six T-12 40-watt lamps with instant-start ballasts. This unit provides a downward component of light varying from 70% for the two-light unit to 55% for the six-light unit. Cutoff from lamp glare is 35° lengthwise and 30° crosswise from the rigid and square louvers. The Director can be surface or pendant mounted, individual or continuous rows. Director is constructed of electrolytic zinc-coated bonderized steel and finished in white supercoat baked enamel with more than 85% reflectivity. Maintainance and installation are effectively simplified in the Director — another new and outstanding fluorescent unit by Smithcraft — manufacturer of "America's finest lighting fixtures" and the leader in progressive lighting design.

Smithcraft

LIGHTING DIVISION

CHELSEA 50, MASSACHUSETTS

Westinghouse

Fluorescent Lamps

NOW LAST 3 TIMES AS LONG!

...YET COST NO MORE!

SAVE 2/3

SAVE THIS— ONE LAMP NOW LASTS AS LONG AS 3.

LAMP COSTS

TIME SPENT REPLACING BURNED-OUT LAMPS

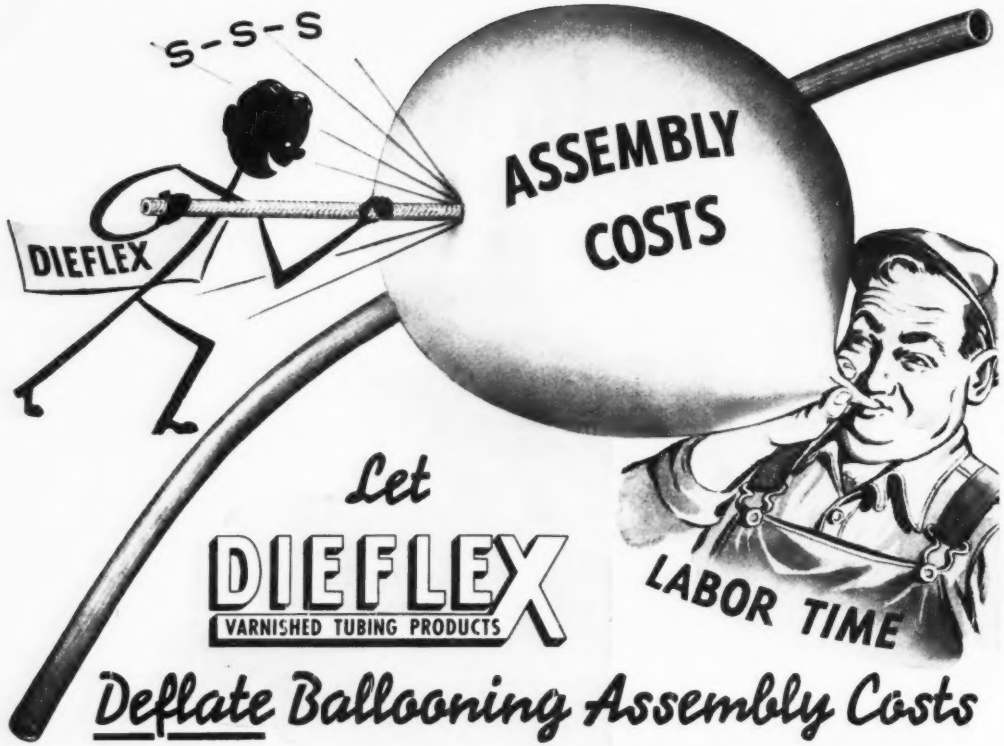
SAVE THIS— LAMPS NEED BE REPLACED ONLY ⅓ AS OFTEN.

Here's the biggest news in fluorescent lamps that's come along in years . . . NOW Westinghouse fluorescent lamps will last 2½ years in average store installations . . . 3 years in average one-shift office or factory installations.

Light output, too, has been improved—Westinghouse fluorescent lamps now burn brighter and longer than ever before. So, when you buy lamps, buy Westinghouse and save! Lamp Division, Westinghouse Electric Corp., Bloomfield, N. J.

YOU CAN BE SURE...IF IT'S

Westinghouse



Let

DIEFLEX

VARNISHED TUBING PRODUCTS

Deflate Ballooning Assembly Costs

You'll be amazed how labor costs shrink when you use Dieflex Varnished Tubing products to save assembly time. Test the flexibility and stretch of Dieflex . . . see how quickly it slides over rough joints and around sharp bends . . . see how its smooth bore prevents snagging . . . how it cuts cleanly without fraying. All these features add up to easier handling and rock bottom assembly costs.

Now, beyond assembly—you can expect fewer breakdowns, reduced repair costs, minimum lost production, because Dieflex gives top mechanical and dielectric protection. Write or phone the sales office nearest you, and start deflating assembly costs today. A folder giving technical information on Dieflex products will be sent upon request.

Braided glass base varnished tubings and saturated sleevings are as inexpensive as corresponding grades of cotton base varnished tubings and saturated sleevings.

DIEFLEX PRODUCTS LIST

MADE WITH BRAIDED COTTON SLEEVING BASE

Grade A-1 Magneto Grade Varnished Tubings
Grade B-1 Standard Grade Varnished Tubings
Grades C-1 and C-2 Heavily Coated Saturated Sleevings
Grade C-3 Lightly Coated Saturated Sleevings
Heavy Wall Varnished Tubings and Saturated Sleevings

MADE WITH BRAIDED GLASS SLEEVING BASE

Grade A-1 Magneto Grade Varnished Glass Tubings
Grade C-1 Extra Heavily Saturated Glass Sleevings
Grade C-2 Heavily Saturated Glass Sleevings
Grade C-3 Lightly Saturated Glass Sleevings
Silicone-Treated Glass Varnished Tubings and Sleevings

TRI-STATE SUPPLY CORPORATIONS

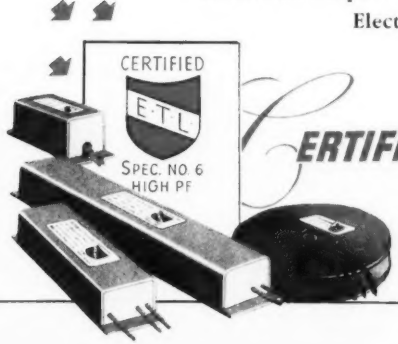
LOS ANGELES 13	SAN FRANCISCO 7	SEATTLE 4
544 S. San Pedro St.	554 Bryant St.	318 Occidental Ave.
MUtual 2354	EXbrook 2-8890	MAin 4161

Certified Ballasts = Dependable Lighting Performance

• You can be sure of long, dependable service from fluorescent fixtures by insisting on Certified Ballasts in the equipment.

Certified Ballasts deliver... Full lamp life
Rated light output
Dependable performance

The reason for this is: Certified Ballasts are made to precise specifications ... specifications which conform to the exact requirements of fluorescent lamps ... then tested, checked and certified by impartial Electrical Testing Laboratories, Inc.



All Fleur-O-Lier fixtures use Certified Ballasts.

CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting

2116 KEITH BLDG., CLEVELAND 15, OHIO

ROCKBESTOS ANNOUNCES

VARNISHED CAMBRIC CABLE

an addition to our line to give you better service

Rockbestos VC cables are manufactured by men with the "know-how" gained from 23 years experience with varnished cambric tapes for high temperature operation on AVC cables.

Insure trouble-free operation and long life of your VC cables. Specify VARNISHED CAMBRIC CABLES by Rockbestos.

ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONNECTICUT

OFFICE AND WAREHOUSE, OAKLAND MUNICIPAL AIRPORT, OAKLAND, CAL.; LOS ANGELES DISTRICT OFFICE, 6919 SAN FERNANDO RD., GLENDALE, CAL.

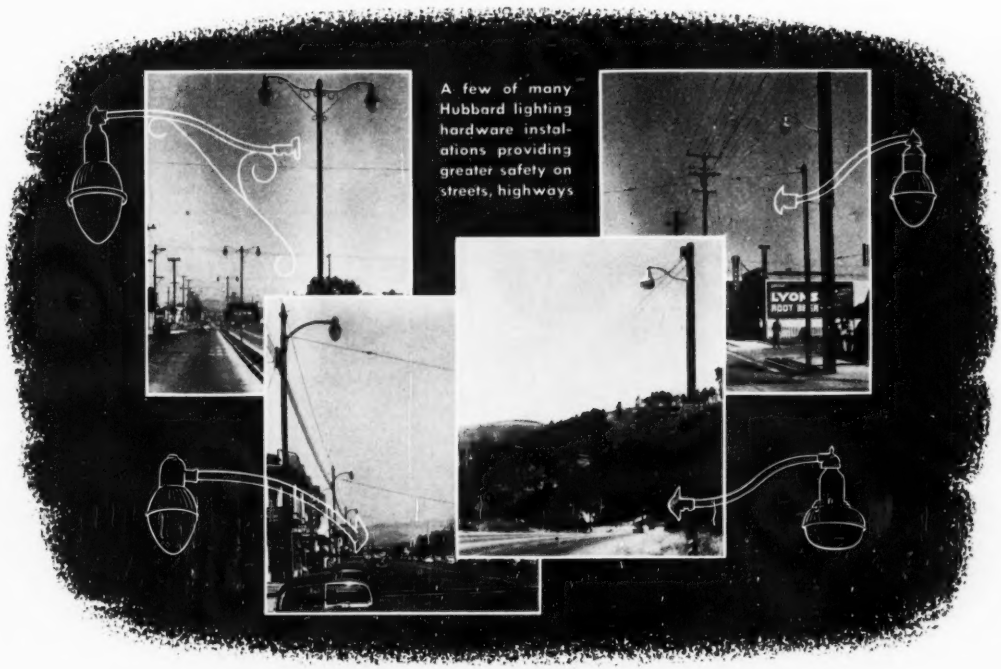
Planned and made to fit *your* needs best, Rockbestos Varnished Cambric Cable is available in every size you require. Write today for specifications and prices.

WIRES and CABLES by

ROCKBESTOS

. . . . . *dare to be better*

There's economy in permanence



...with **HUBBARD** *lighting hardware*

Close cost accounting quickly proves the long-term economy of HUBBARD lighting hardware. Simplified installation cuts initial costs. Surfaces near wiring are smoothly rounded to protect insulation and eliminate maintenance expenses. Every part is carefully engineered to combine styled appearance, utility and strength to withstand the buffeting of winds through countless years. HUBBARD'S famous bonded hot double-dip Galvanizing process gives complete lifetime protection against the costly ravages of rust. As you modernize street and highway lighting for greater safety, specify the economy in permanence offered by HUBBARD lighting hardware—to match existing systems or meet new specific requirements—available through Graybar Electric Company, Inc., or General Electric Supply Corporation.

HUBBARD AND COMPANY

PITTSBURGH OAKLAND, CALIFORNIA CHICAGO

HANG THE LOAD ON HUBBARD HARDWARE

How to stump a doctor (IN ONE ACT) •••

Doctor: Name?

Seymour: Seymour Kerite.

Doctor: Age?

Seymour: 95.

Doctor: Er, would you repeat that, please. For a second I thought you said 95, ha-ha.

Seymour: I did.

Doctor: Good gracious, you must be about ready to cash in your chips! Here, lie down while I take your blood pressure. Hmmmm. Ahem. Ahhh, yes. Remarkable!

Seymour: The verdict, doc?

Doctor: Unbelievable! Why, you're in perfect condition. Lively, healthy, and vigorous. How in the world do you do it?

Seymour: You see, doc, it's like this. For nearly a century I've been busy keeping folks satisfied — supplying them with cable insulation that stands up no matter what, lasts a long, long time at a low, low cost per year. And in spite of the fact that many new kinds of insulation are available today, more people want Kerite than ever before — keeping me busier and busier. I *have* to stay young, doc, to keep these folks happy.

Doctor: Very unusual, yes, very. Old in experience, young in spirit. Hmmmm, interesting case.

Seymour: Your prognosis, doc?

Doctor: Mr. Kerite, this examination leads me to believe that you will stay young as long as the electrical industry needs cable insulation with long life and low cost per year.

Seymour: Those are my plans, doc!

The Kerite Company, 30 Church St., New York 7, N. Y.

Kerite Insulation—
Your Cable's Best Life Insurance

KERITE CABLE

Get this Low Cost Oil Protection

IN YOUR NEXT SUBSTATION TRANSFORMER

Sealed Tank Design

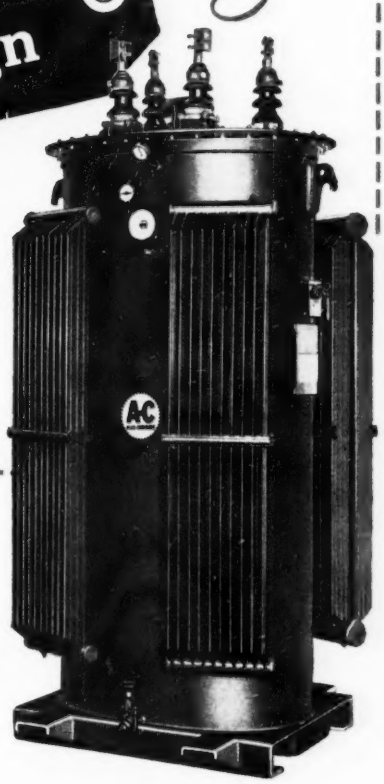
SIMPLE . . . PROVEN . . . readily adaptable to lower kva power transformers at *lower cost* . . . these are reasons why Allis-Chalmers Sealed Tank design is recommended for power transformers 34.5 kv and less, 2500 kva and below.

By providing an air-tight seal, atmospheric oxygen and moisture are permanently sealed from transformer oil, thus preserving its dielectric qualities and preventing formation of sludge.

Sealed Tank design is just one of several types of Allis-Chalmers oil protection. Others include the famous *Oil-Sealed* Inert Gas and the *Expansion Tank* methods . . . each designed for greatest effectiveness in its own range and type of application.

For further information on A-C oil protection, or any other phase of Allis-Chalmers quality transformer construction, contact your A-C sales representative. Or write direct. A-2799

ALLIS-CHALMERS, 939A SO. 70 ST.
MILWAUKEE, WIS.



✓ *SIMPLE*. . . . No wearing parts . . . no expensive alarm systems required . . . no replenishment schedule to follow.

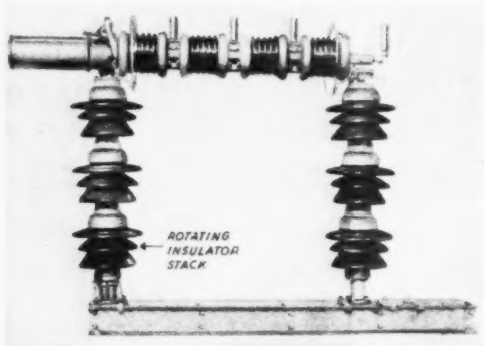
✓ *PREVENTS SLUDGE*. . . Filtering requirements are reduced because oxygen and moisture are *positively* sealed out.

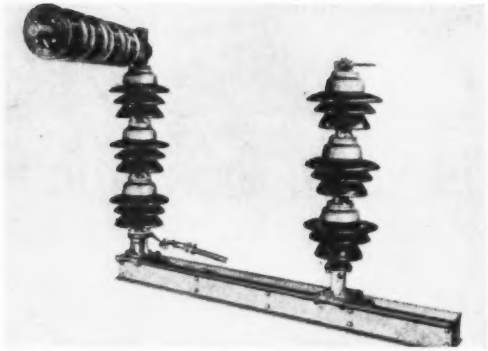
✓ *PREVENTS ACIDITY*. . . Positive moisture seal also prevents formation of harmful acids — helps to preserve transformer insulation.

✓ *LOW OPERATING TEMPERATURE*. . . Cooling ducts are kept open because oil remains sludge-free . . . permits cool, efficient operation of transformer.

ALLIS-CHALMERS A-C ALLIS-CHALMERS

PRODUCT NEWS

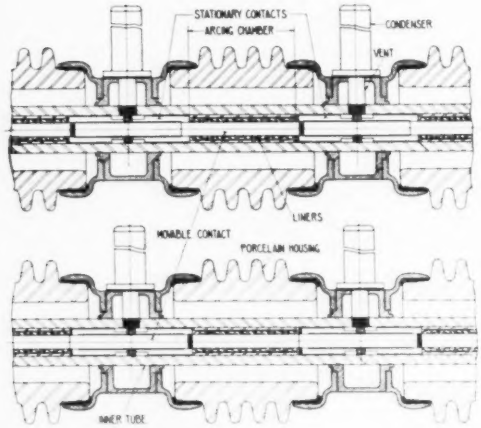




Three E 115-kv. air interrupting switch with interrupting capacity of 250,000 kva. Total opening time is 8 cycles

115-kv. Pole-Top Air-Break Interrupter Switch

(1000) Electrical Engineers Equipment Co., 25th Ave. and Division, Melrose Park, Ill.



Construction of interrupter element. Consists essentially of an arcing chamber, stationary and movable contact and condenser. Stationary contact is in the form of a copper tube, slit lengthwise and the segments made to engage the movable contact. Tubular movable conductor is joined to adjacent movable contacts by an arc resistant insulating rod. All contacts are equipped with sintered tungsten arcing rings. Low maintenance was important factor in design

Development of a 115-kv. air interrupter switch to fill the gap between horn gap switches and oil circuit breakers has been announced by Three E. The switch has a continuous rating of 200 amp. at 115 kv. with an interrupting capacity of 250 MVA. Operating characteristics permit its use, not only for manual switching, but also as a protective device for automatic interruption of fault currents of moderate magnitude.

The device consists essentially of an interrupter unit and disconnect switch (see cut), so arranged and operated that a visible air gap may be obtained upon interruption of the current. The arc is interrupted in the arcing chamber by the pressure and effective blast of gases produced by the action of the arc upon solid material enclosed in the arcing chamber. No oil or air blast is required, either for arc interruption or for operation. Interrupter unit is combined with a simple side-break type of disconnect, but it may be rather readily adapted to other types of disconnects. The interrupter is mounted on standard B.I.L. insulator stacks for 115-kv. rating and has corresponding length of break and clearances for this rating when in disconnected position.

The switch may be furnished with a conventional remote control operating mechanism for manual operating only, or it may be furnished with motor operator for electrical operating from an a-c or d-c source. Total opening time when tripped by motor device is approximately 20 cycles. A spring trip mechanism is available that reduces total opening time to 8 cycles. Time for complete opening or closing of arcing contacts is approximately 1½ cycles.

Under test the switch has successfully interrupted 250 MVA fault current and also 44 amp. of charging current of a 120-mile line at 115 kv. Line charging current is interrupted during the first half of cycle following first current zero which is of importance in preventing high-frequency oscillations that may cause failure of insulation.

For Uninterrupted Service Under All Network Conditions

ANW
(Anaconda Net Work)

Time-tested since 1932 under all service conditions, subsequent improvements provide additional security in this long-famous network cable.

● Tough, easily handled, Type ANW-insulated, neoprene-jacketed cable incorporates six important advantages . . . important to you for underground duct installation:

1. Better heat and flame resistance—protected by the same neoprene jacket as Anaconda mining cables which must and do meet the severe flame test of the U.S. Bureau of Mines.

2. Higher resistance to duct acids and alkalies—years of experience with Type ANW insulation with only a braid covering showed it to be highly resistant to oils, acids and alkalies encountered in soil and sewage waters. NOW it has the additional protection of the neoprene jacket which itself has shown by test and experience, excellent resistance to these agents of destruction.

3. Higher operating temperature—now 75 C copper temperature, continuous duty.

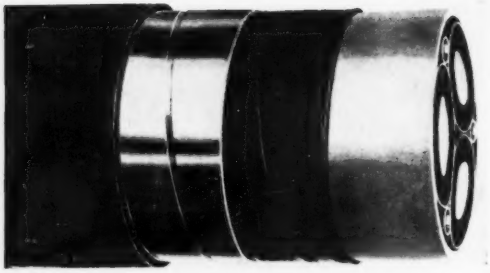
4. Superior aging—Type ANW insulation has demonstrated year after year . . . and now even better . . . long-aging characteristics under severe oxygen bomb and air bomb tests.

5. Low moisture absorption—Type ANW insulation has always had low moisture absorption . . . far less than is detrimental to safe operation.

6. More easily handled—passes 180 degree cold-bend test at 0° C without damage to jacket. Cable is lighter, easier to pull. No lead to fuse, insulation and jacket do not support combustion.

ANACONDA
from mine to consumer

ANACONDA WIRE & CABLE COMPANY
25 Broadway, New York 4, N. Y.



New Sheath for Medium-Pressure Gas-Filled Cable

(1001) The Okonite Co., Passaic, N. J.

This new covering eliminates the second and outer lead sheath previously required for medium-pressure gas-filled cables operating at 40 psi. The weight-reducing sheath combination has a vulcanized 40-mil wall of asbestos-neoprene and neoprene-filled, fungicide-treated cable tape over the single lead sheath, providing a rugged, moisture-tight cushion claimed to be superior to paper tapes previously used. Over this are wrapped two .005-in. bronze reinforcing tapes, which in turn are sealed within a vulcanized Okosheath protective covering approximately 115 mils thick.

The sandwiching of the bronze reinforcing tapes between two insulating and moisture-resistant cushions is said to eliminate possibility of galvanic action occuring in double-lead-sheathed cables when the outer lead covering is damaged and moisture penetrates into the area between the bronze tape reinforcement and the inner lead sheath.

It is pointed out by the manufacturer that this new sheath combination has practical value also for certain applications of solid type and oil-filled cables, where internal pressures cause excessive hoop stress in the lead.

Pole Butt Ground Plate

(1002) A. B. Chance Co., Centralia, Mo.

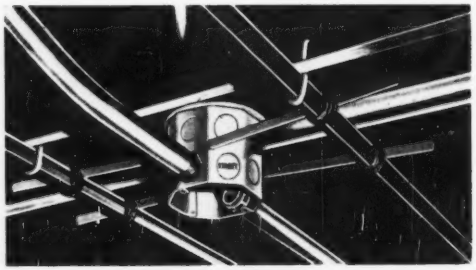
Spiked projections on this new-type pole butt ground plate penetrate the earth and are claimed to reduce resistance more than 15%, compared to a flat plate of equal size. The plate is of 1/32-in. copper sheeting, $7\frac{1}{2}$ in. square; is nailed to the pole through a center hole. Two types are available. The first one (illustrated) has a length of No. 6 soft drawn copper ground wire brazed into a slot in the plate; loose end of the wire is uncoiled and stapled to the pole to make the ground connection. In the second type, one of the spiked projections is slotted and provided with a split bolt connector for the ground wire connection.

Hung Ceiling Box

(1003) M. B. Austin Co., Northbrook, Ill.

Designed particularly for use with the suspended ceiling type of building construction, this Knight patented box is slotted for insertion of the two parallel bars along which it may be moved to position. The box is automatically locked in place by a slight outward expansion of the bars, which are then tightly fastened to the supporting framework.

The box bars are mounted on channels securely tied to cross members suspended from concrete beams above, and



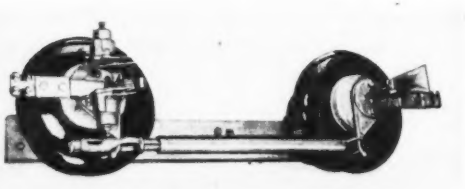
the box is thus below the beams which normally prevent conduit from entering except from a position parallel to the beam. The box is fitted with an upper row of knockouts permitting conduit to enter over the grid structure at eight different angles, and a lower row permitting conduit to run parallel with the channels.

Fabricated of hot dipped galvanized sheet steel, the box is furnished with 13-in. bars, or with special lengths on request. The two bars on a 16-in. span will support a 90-lb. load; a 130-lb. load when two bars are used on each side.

New Type Fuse Jumper

(1004) Southern States Equipment Corp., Hampton, Ga.

Designed to shunt outdoor power fuses to avoid service interruption while fuse elements are being inspected or replaced, the type JDM jumper consists of two terminal rings connected through a bakelite tube by a flexible shunt. Spring-loaded to develop contact pressure, it is available for all voltages from 34.5 through 161 kv, and can be used with fuses of any manufacture using NEMA standard insulators. According to the manufacturer, existing fuses may be adapted to permit use of this jumper.



Accuracy of Type FR-1 Recloser Assures Best Continuity of Service!

This rugged mechanical timer masterminds the General Electric FR-1 Automatic Recloser. Operating in air, its time-current characteristics remain exactly as published regardless of temperature, or viscosity changes of oil. You are assured of positive coordination — with breakers, reclosers in series, and with fuses.

Don't Lose Minutes of Protection While a Recloser Resets!

The FR-1 resets in a matter of seconds — instead of minutes — avoiding unnecessary fuse blowing and recloser lockouts from rapidly recurring faults. It holds service trips to a minimum during lightning and windstorms.

Picking Up the Load Is Easy!

With conventional operating function, manual reclosure is on time-delay. Furthermore, only G.E. includes the alternate "hold-closed" function — inrush currents can't lockout the recloser because it holds closed until these currents have subsided, then automatically resets for normal operation. This exclusive function also permits the use of more sectionalizing points and enables a saving in system investment.

Interrupting Ratings Are Realistic at Full Voltage!

The FR-1 performs smoothly at voltages from 2400 to 15,000. It is capable of clearing its maximum interrupting rating even at full voltage — your assurance of greater reliability.

No Problem with Load Growth!

No need to worry about load growth damaging the recloser. The FR-1 is self-protecting on overloads — withstands continuous current up to its minimum pickup rating — a feature which gives you time to plan system changes.

No Other Recloser combines these essential features. In addition the FR-1 gives you: choice of two operating functions — oil-blast interrupter — relay control of interrupter circuit — bushings interchangeable with those of modern G-E transformer — Thyrite protection for coils — conversion of ratings in service.

For a full story on this recloser including coordination data, write for bulletin GEA-4934. Address your nearest G-E Apparatus Sales Office or *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

TRIPLOC Plugs and Receptacles

1, 2, 3, 4, 6, 8 pole interchangeable and reversible contact units.

An Exceptionally Versatile Line in the Heavy Duty Field

An exceptionally versatile line, unequalled in the heavy duty field, with a virtually unlimited number of assembly combinations to meet the individual requirements of *any* portable electrical equipment.

Interchangeable contacts, 1 to 8 poles, can be assembled in standard plug shells and receptacle housings. The protected female contact unit can be assembled in either plug or receptacle for safety in the line side of the circuit. Fusible types and units with one pole grounded are also available.

Automatic bayonet lock with either manual or combination manual and automatic release protects equipment and wiring. Wide range of pressed steel plug shells, receptacles, and cord connectors available in the complete Triploc line, including cast metal housings threaded for watertight gasket seal. Ratings up to 20 amperes, 250 volts DC, 460 AC. Consult your Pylet Catalog 1100, Bul. 1140-1, for complete listings.

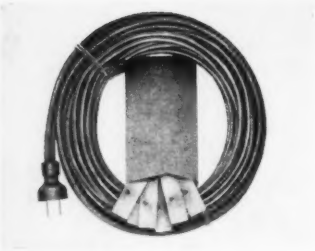
CONDUIT FITTINGS • FLOODLIGHTS

SINCE 1897

THE PYLE-NATIONAL COMPANY

1364 N. Kostner Ave., Chicago 51, Ill.

Pacific Coast Sales Office
25 Beale Street, San Francisco 6, Calif.



Roof De-Icing Kit

(1005) Rockbestos Products Corp., New Haven 4, Conn.

This unit consists of 60 ft. of lead-sheathed heating cable, with standard plug and shingle clamps for attaching to roof. The cable, looped around the edge of the roof, melts channels through the ice, allowing water to drain away normally, the manufacturer states. The kit is rated 460 watts and is designed for 110- to 120-volt operation. It is claimed that one kit will protect from 18 to 20 ft. of roof.

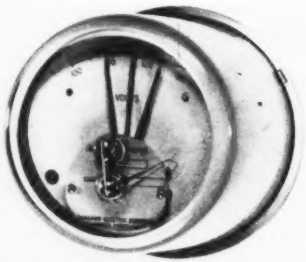
New Aids in Voltage Control

(1006) Sangamo Electric Co., Springfield, Ill.

Lincoln Type V-28, a new indicating maximum-minimum voltmeter, is said to make use of graphic meters unnecessary in most cases. It gives continuous information, according to the manufacturer, and graphics need be used only when more detailed data are required. This voltmeter is time-lagged so that instantaneous values are not shown and has a maximum and minimum pointer. A pusher pointer, fixed to the actuating element of the meter, lies between these pointers and spreads apart with changes in voltage. The maximum pointer shows the average over the period of highest voltage (approximately ten minutes), while the minimum pointer shows the lowest average voltage over a similar period. The pusher pointer shows the average voltage at any time.

A new graphic voltmeter, Lincoln Type CCV, is also time-lagged and is equipped with a pen that provides a continuous record, any point of the curve being the average over the immediately preceding interval of approximately ten minutes.

Both types will withstand surges of 12-kv. level and are temperature-compensated for outdoor use. The indicating meters are supplied in socket construction, suitable for outdoor installation. The graphic meters come in indoor cases with chart-viewing window, or outdoor cases without window. All types are supplied for ranges of 95 to 135 volts, or 190 to 270 volts. The entire scale of the meter is available for these voltage ranges.



HCI Safety Switch

(1007) The Trumbull Electric Mfg. Co., Plainville, Conn.

The HCI switch has a new arc-quenching design and actuating mechanism, said to give it ability to break unusually heavy loads quickly and safely. It is also claimed, when properly fused, to have unusual ability to withstand heavy short circuits.

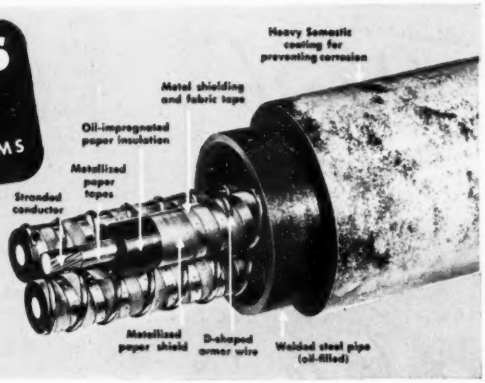
The arc-quenching feature was made possible by a magnetic repulsion action. Arcs formed by double-break contacts repel each other and are driven against grid pins that cool and deionize them. The actuating mechanism gives positive quick-make, quick-break action by means of a roller-cam, multiplying linkage design combined with a powerful spring.

These switches are manufactured in 30-, 60- and 100-amp. sizes and are Underwriters' approved. Semi-dust-tight enclosures are available.

ANY WAY YOU FIGURE IT . . .

FIRST CHOICE IS OILOSTATIC

HIGH-PRESSURE PIPE-TYPE CABLE SYSTEMS



FIGURED BY CIRCUITS . . . it's 4 to 1 (for generator leads — 100%)

Here are the figures by circuits installed or under contract as of September 1, 1949:

Pipe-Type System	Transmission Circuits	Generator Lead Circuits
High-Pressure Oil (Oilostatic Type)	44	25
Compression Oil	5	—
High-Pressure Gas	11	—
Compression Gas	2	—
Total	62	25

A total of 87 circuits of all types have been purchased and, of these, 80% (69 circuits), are of the Oilostatic type. For generator lead circuits alone, 100% are of the Oilostatic type. Okonite-Callender has supplied 56 of the 69 Oilostatic type circuits.

FIGURED BY UTILITIES . . . it's 3 to 1

Here are the figures by number of utilities purchasing these systems:

Pipe-Type System	No. of Utilities
High-Pressure Oil (Oilostatic Type)	21
Compression Oil	3
High-Pressure Gas	4
Compression Gas	2
Total	30

A total of 27 separate power and light companies have purchased high-pressure pipe-type systems, one having as many as 12 separate circuits in operation. Only three utilities have installed 2 types of cable systems. Oilostatic-type systems, however, have been purchased by 21 or 3 out of 4 of these 27 utilities.

OTHER OILOSTATIC FIRSTS in High-Pressure Pipe-Type Cables

- 1st transmission system, 1935
- 1st application of high-pressure 161-kv potheads, 1935
- 1st generator lead installation, 1941
- 1st cabinet-type packaged pumping unit, 1946
- 1st submarine crossing, 1947
- 1st termination directly into transformer, 1949

There are good reasons why Oilostatic* high oil-pressure pipe-type cable systems have become the predominant choice of power and light companies within so few years. Oilostatic type systems offer a combination of advantages that increase circuit reliability, save money and labor.

Higher Dielectric Strength — entirely immersed in oil under 200 lbs. pressure to insure its high dielectric characteristics; no voids in the insulation, therefore no ionization.

Greater Simplicity — space saving: no ducts, no lead sheath; no riser cable problems; relieves congestion at points where overhead lines are impractical; also saves space in generator stations.

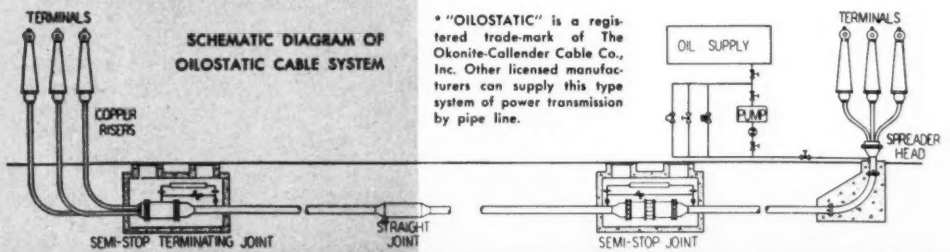
Easy Installation — all phases installed simultaneously in pulls up to 3600 ft.; simple joints and terminals.

Broad Transmission Applications — highest current carrying capacity under emergency overload; no practical voltage limit; cables can be furnished for any present-day operating voltages.

Substantial Savings — when used in preference to a duct system, savings from 15 to 30% are obtained in city street installations; in open country 25 to 40% may be effected.

Same installation for land or submarine projects — unaffected by elevation, contour or nature of terrain.

Quick and easy to install, of rugged construction and requiring very little maintenance, dependable Oilostatic may be the answer to your problem when handling bulk power. For complete installation and operating details, let an Okonite engineer consult with you. Also, for your information and help is Okonite's 16 mm. colored, "Oilostatic" film, supplemented by Oilostatic File Folder WE 75. Both are available upon request. Call or write to The Okonite Company, Passaic, New Jersey.

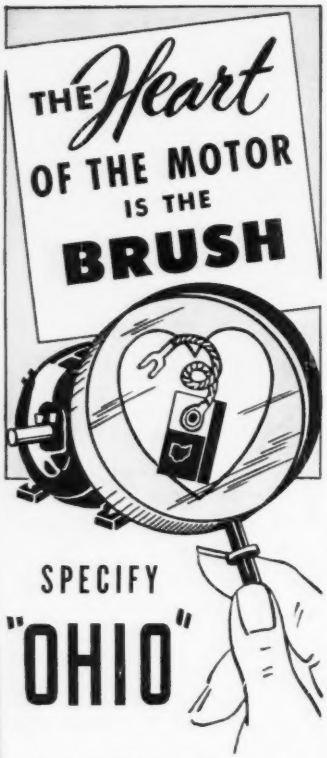


SCHEMATIC DIAGRAM OF OILOSTATIC CABLE SYSTEM

* "OILOSTATIC" is a registered trade-mark of The Okonite-Callender Cable Co., Inc. Other licensed manufacturers can supply this type system of power transmission by pipe line.

OKONITE-CALLENDER paper insulated power cables

7741



OHIO MOTOR BRUSHES offer you the maximum in efficient commutation. They are "precision-made" and are processed by us from raw materials through to the finished product. For complete motor brush service look to "OHIO" from all standpoints, engineering, new development, special requirements and dependable manufacturing.

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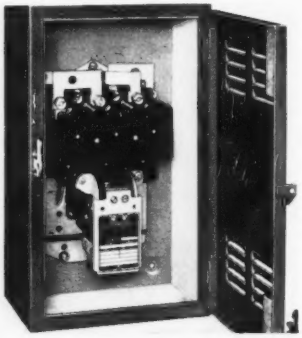
THE OHIO CARBON COMPANY
12508 BEREA ROAD • CLEVELAND 11, OHIO

50-amp. Welder Contactor

(1008) Square D Co., Industrial Controller Division, Milwaukee 12, Wis.

This Size OW, 50-amp. welder was designed for small spot welding machines to 10 kva., 220 volts or 20 kva, 440 volts. High rupturing capacity is provided by two double-break contacts connected in series, giving a total of four breaks. Heavy copper bus straps permit large welder cables to be connected easily and are located for accessibility. Contacts are silver. A floating armature is pivoted on a hardened steel pin, and the pin bearing is hardened for long life. Magnet life has been increased by shortening armature travel and increasing air gap, the manufacturer states. Using a screwdriver, an operator can remove or replace movable contact assembly, terminals, contacts and magnet coil.

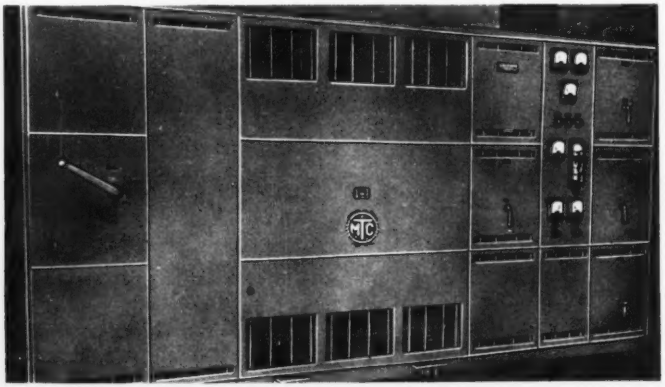


A-C Load Visualizer

(1010) General Electric Co., Schenectady 5, N. Y.

This improved a-c load visualizer (Type AF-2) combines five instruments in one: is a standard 0-2.5/5/25 50-amp. ammeter and a 0-150/300/600-volt voltmeter; may be used with a split-core or conventional instrument transformer to extend the range for determining watts, vars, volt-amperes and power factor. It can be applied in load surveys, induction motor tests, reactive power studies and power factor checks in power and lighting circuits. It is self-contained to 50 amp.; extensible to 1,000 amp. by split-core current transformer. Accuracy is claimed to be within 2% for volts and amperes; 5% for component amperes.

(1009) In this line of air-cooled unit substations, the complete package consists of a dry-type transformer, primary protection and secondary breakers and required metering equipment. A choice of various types of primary and secondary equipment is offered. The transformer section is constructed throughout with Class B and C heatproof insulation, the manufacturer states. Comes in sizes from 100 to 2,000 kva., in single and three phase, voltages up to 15,000. Marcus Transformer Co., 32-34 Montgomery St., Hillside 5, N. J.



INSTALL CONDUIT FOR KEEPS

with APPLETON "STA-TITE" Pipe Hangers

Type "PHS" for use with single conduit.

Firmly, Permanently Grip Both Rigid and Thin Wall Conduit!

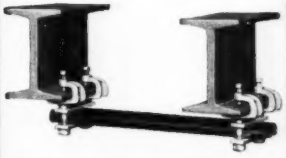
For ruggedly dependable performance under the most severe service conditions, standardize on Appleton "Sta-Tite" Pipe Hangers.

Easy installation of these sturdy pipe hangers is assured by clean threading, smooth finish, expert over-all design.

Made of tough Malleable Iron in Appleton's own foundries and fabricating plants, "Sta-Tite" Pipe Hangers speed and simplify complex jobs—enable you to run conduit parallel to the beam, at right angles or at any angle in between.

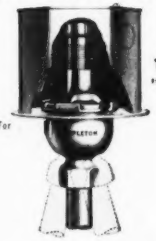
Whatever the wiring requirement, you'll find the exact fitting you need in the 15,000-item Appleton Line. For faster completion of better jobs, specify Appleton—STANDARD FOR BETTER WIRING.

Type "PHD" with two conduits parallel with structural shape.



Type "PH" with strips for suspending groups of pipe from structural shapes.

APPLETON
SAFETY SWIVEL HANGERS



Designed to assure adequate support for heavy duty lighting fixtures used in industrial installations. Entire weight of suspended unit is carried by a fixture stud, greatly increasing load capacity of hanger unit.

WRITE FOR COMPLETE CATALOG INFORMATION

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

1709 Wellington Avenue • Chicago 13, Illinois

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APPLETON ELECTRIC PRODUCTS

APPLETON

CONDUIT FITTINGS • LIGHTING EQUIPMENT • OUTLET AND SWITCH BOXES • EXPLOSION-PROOF FITTINGS • REELITES

IRV-O-SLOT

The slot insulation *Bound* to last longer

Won't Migrate! Won't Delaminate!

The big news about Irv-O-Slot is good news for motor manufacturers. This famous slot insulation, with all its excellent electrical characteristics, benefits by a new, specially-developed Irvington binder that doesn't harden or lose its tack; that provides full assurance against migration . . . against delamination . . . against oozing out under heat. Thus Irv-O-Slot provides far greater service life, and far longer shelf life as well; and the thickness of the finished insulation is held within exact tolerance limits.

***Test Data:* The normal delamination test for slot insulation is 96 hours at 125 C. Laboratory tests show Irv-O-Slot withstands 150 C for over 288 hours, retaining full bond without migration.**

Irv-O-Slot is available in straight-cut or seamless bias varnished cambric bonded to either fish paper or rag stock. Write for generous test samples, further information.

"Look to Irvington **for Continued Leadership in Insulation"**

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Represented in the Western States by
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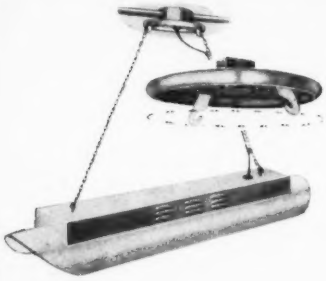
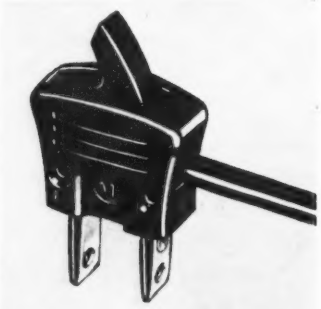


Fixture Hanger

(1011) Appleton Electric Co., 1701-41 Wellington Ave., Chicago 13, Ill.

The SFH fixture hanger is made with a pair of snug-fitting clips that hook to ears of outlet box, supporting fixture in event mounting screws work loose. It has pear-shaped screw holes and may be mounted in place without removing screws from outlet box. After screw heads clear holes, a 10° turn locks hanger in place with safety clips behind ears in outlet box. Sliding clips take chains for suspending fixture. Available with 2-wire receptacle or 3-wire twist-lock receptacle. May be ordered complete with two 5-ft. chains, hooks, cord and clips.



Clamp-on Cap

(1012) Monowatt, Inc., 66 Bissell St., Providence, R. I.

A one-piece brown plastic cap, this device is said to do away with stripping insulation and twisting wires to binding screws. It is for use with all standard No. 18, 2-conductor rubber, plastic or rayon-covered parallel cords, and is Underwriters' approved. To use, end of cord is cut off square; cord is slit slightly between wires and is inserted in side of cap; clamp is pressed down. Side outlet permits cord to stay close to wall.

TOP LINES
for all lines

. . . are available from Graybar

For distribution or transmission lines — construction or maintenance — Graybar has all the *supply* lines you need. You can count on every item, because Graybar's standards of selection are tough! Everything Graybar distributes is a product of a leading manufacturer. Its efficiency and reliability have been tested, proved, and improved through years of research and field service.

POLES AND CROSSARMS

Graybar-selected poles — full-length pressure-treated pine and fir; and full-length pressure-treated, butt-incised cedar. Rainier fir crossarms that have the proven strength and durability to resist taxing combinations of heavy conductor load and shock from snow, ice, and wind.

Wire, strand, hardware

Crapo strand and high-strength static wire to fit your specifications . . . Hubbard braces, brackets, and racks for long-lasting pole structures . . . Chance pole anchors for guying of all types . . . Reliable connectors for quick, secure tap-offs . . . rugged O-B insulators . . . and everything else the project requires!

ALL THE TOOLS, TOO!

Help your linemen do each job quickly, efficiently, and safely — supply them with all the proper tools. Graybar has everything from pliers and rubber gloves to FWD line trucks. To round out our complete service, there is a Graybar Outside Construction Specialist to consult with you on any special problem "from the bottom of the hole to the top of the pole." *Graybar Electric Company, Inc. Executive Offices: Graybar Building, New York 17, New York.* 4961

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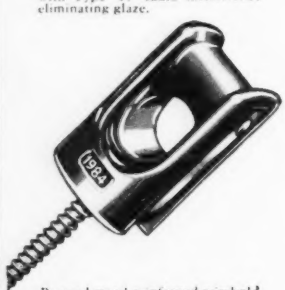
Rugged 6" Suspension Insulators—compression glazed for extra mechanical strength. Designed to withstand strain of wind and ice loads.

Pintypes that take a load off lineman's shoulders. Can be furnished with Type "N" radio interference eliminating glaze.



Rugged metal-reinforced wireholders with well rounded wire ways, heavy galvanized steel strap. Semi-float self-aligning action assures proper seating.

SEND YOUR INQUIRY TO
Porcelain Products, Inc.
PARKERSBURG, W. VA.

Contactor

(1013) Allis-Chalmers Mfg. Co., Milwaukee, Wis.

A new high-voltage air-break contactor, type 256, takes space about equal to that required for an oil-immersed contactor. Adequate insulation has been provided between all live parts, according to the manufacturer, and mechanical sturdiness and accessibility have not been sacrificed.

Double-break contacts halve the arc voltage and double the rate of dielectric recovery. These, with a vertical direct-action solenoid-type magnet, eliminate need for flexible leads, turning shaft and shaft bearings.

Three principles of arc extinction are incorporated: two breaks in series, magnetic blowout and increasing length of arc path, horizontally and vertically. Available with mechanical and electrical interlocks for reversing or dynamic breaking service.

(1014) A HAND HYTOOL, No. Y9M—Cuts wire, strips insulation and indents Hydent connectors on wires No. 22 through 10; features die groove that closes insulation grips; has long handles of one-piece molded plastic. Hytool is made of case-hardened steel, black finish. Burndy Engineering Co. Inc., 107 Bruckner Blvd., New York 54, N.Y.

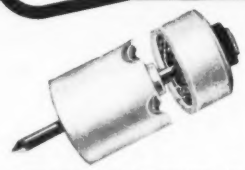
(1015) CABLE. A non-metallic sheathed cable, RoBarn, has been developed for interior wiring of farm buildings and general purpose use. It is Neoprene-protected against moisture, acids, alkalies, oxidation, and flame. Available in 14, 12, 10 AWG, two and three conductor; Underwriters' approved. Rome Cable Corp., Rome, N.Y.

(1016) CONNECTOR. Designed for stranded wire and cable from No. 1 to 1,000 mcm, for outdoor and indoor use; has helical serrations in the wire bearing surfaces that increase gripping and holding ability. It is claimed to produce high pressure on the wires and make very efficient low-resistance connection. Jasper Blackburn Products Corp., St. Louis, Mo.

(1017) INSULATING TAPE. Type R-12 and R-20 Silastic tape consists of Fiberglas cloth impregnated and coated on both sides with Silastic rubber, a rubber-like dielectric said to withstand temperatures far above those causing decomposition in ordinary rubber and resinous insulations. Irvington Varnish and Insulator Co., Irvington, N.J.

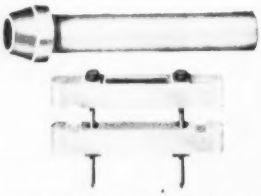
(1018) TERMINAL BLOCKS. New sectional terminal blocks of single-circuit type can be assembled into strips of any length from one to 75 pairs. Blocks are of molded Melamine for high dielectric strength. Units are twisted into a keystone-type mounting channel; intermediate units may be removed without disconnecting other units. Come in 25 and 50 amp. sizes, for any voltage up to 600 a-c or d-c. Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Penn.

...and for
LOW VOLTAGE TOO!
call
Porcelain Products



Dense, good looking, positive gripping ALLIGATOR Nail Knobs are preferred by electricians insisting on workman-like installations to build good-will and repeat business.

Outlet boxes with Adjustable Metal Mounting lugs and set of Hangers are nationally famous for durability, ease of installation and safety features.



A complete size range of tubes as well as 2 and 3 wire cleats are available for immediate delivery. Made precisely to give long and satisfactory performance.

Both round and oval type split for estry insulators as well as telephone insulators are available for immediate delivery.

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They go together

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The National Telephone Supply Company

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Export Distributor—INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

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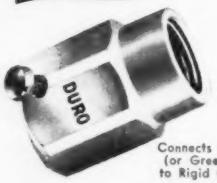
DURO
The All-Steel Line

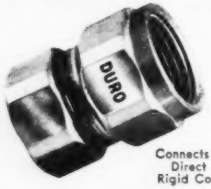


Connects Flexible (or Greenfield) to Rigid Conduit

Precision-Made CONDUIT FITTINGS

Connects Flexible (or Greenfield) to EMT Conduit

CUT YOUR COSTS RIGHT DOWN THE LINE



Connects EMT Direct to Rigid Conduit

COMBINATION COUPLINGS

Time-Savers . . . Money-Savers

DURO Combination Couplings are machine turned from solid bar steel—perfectly reamed, properly gauged and carefully chamfered.

They make a cheaper, easier and neater union than the assembly of other fittings frequently used.

DURO products are made in the West by a Leading Western Manufacturer and are distributed by qualified wholesalers throughout the West. IMMEDIATE DELIVERY—ALWAYS—ANYWHERE IN THE WEST.

Complete catalog on request.

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BULLETINS ETC.

(1019) SHUNT CAPACITORS—A new bulletin on use of shunt capacitors for power factor correction includes several sample calculations related to their installation to supply reactive loads. Among these are voltage improvement gained, increased real power available, and the determining of correct amount of kvar installation. Tables of physical data are included, as are recommended fusing practices and circuit connections. Available from James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo.

(1020) BREAKER—The Ruptair replacement unit is offered for replacing obsolete oil circuit breakers of insufficient interrupting capacity in older distribution substations. Dimension and ratings are contained in Bulletin 1887094 available from Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis.

(1021) HEAT CONTROL — Therm-a-neering, a heat control engineering service, is described in Bulletin B-4031 from Westinghouse Electric Corp., Meadville, Pa.

(1022) INSULATION — "The Story of An Insulation" explains construction features of Rockbestos AVC insulation. Offered by Rockbestos Products Corp., New Haven 4, Conn.

(1023) SLOT INSULATORS—A data sheet of styles is available from Insulation Manufacturers Corp., 565 W. Washington Blvd., Chicago 6, Ill.

(1024) FIXTURES—Data sheets on No. 179 entrance light and No. 188 pigtail-type haymow light are offered by Union Insulating Co., P. O. Box 351, Parkersburg, West Va.

(1025) FIXTURE HANGING — Four-page folder describes Unistrut method, tells how to order. Unistrut Products Co., 1013 W. Washington Blvd., Chicago 7, Ill.

(1026) WIRE ROPE SOCKET—Bulletin No. 1, an industry standard compiled by wire rope industry engineers, is available from Wire Rope Institute, Shoreham Building, Washington 5, D. C.

(1027) SWITCHGEAR—Installations in Oregon and Washington are the subject of Vol. 1, No. 4 of "Outdoor Switchgear," published by Pacific Mfg. Corp., 5815 3rd St., San Francisco 24, Calif.

(1028) WIRING MATERIALS—A line for farm use is described in Catalog 596 available from National Electric Products Corp., Chamber of Commerce Bldg., Pittsburg, Pa.

(1029) DEVICES—Automatic locking plugs, receptacles and cord connectors are described in Catalog EL49-121 offered by Russell & Stoll Co., 125 Barclay St., New York 7, N.Y.

(1030) INSULATION TESTING — Vibrotest models from 100 to 50,000 megohms are described in 4-page Bulletin 209 from Associated Research Inc., 3758 W. Belmont Ave., Chicago 18, Ill.

(1031) CONDUIT — Items in the Triangle line of conduit, wire and cable are listed in a 12-page condensed catalog, No. 49, issued by Triangle Conduit & Cable Co., 1904 Jersey Ave., New Brunswick, N. J.

(1032) PLUG-IN BUSWAYS—A new circular on FVK Flex-A-Power system for distribution of light and power has been published by Trumbull Electric Mfg. Co., Plainville, Conn., as TEC-151. This 4-page circular shows photographed installations, lists features. Also shown are pictures of an enclosed fusible safety switch, a thermal circuit breaker, ground detector, neutralizer and capacitor.

ELECTRICAL WEST, 68 Post St., San Francisco 4, California
Please send me information about following CIRCLED items:

1000	1001	1002	1003	1004	1005	1006	1007	1008
1009	1010	1011	1012	1013	1014	1015	1016	1017
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* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

Cables run COOLER...
in TRANSITE DUCTS

. . . reducing copper losses

. . . increasing current capacity

. . . prolonging insulation life

HERE'S HOW to reduce copper losses . . . increase current carrying capacity . . . and prolong insulation life—run your cables in Transite* Ducts.

Current carrying capacities can be increased in a typical duct bank as much as 5%, or I^2R losses can be reduced 11%, for cables located in Transite as compared with other ducts used for power circuits.

And, Transite Ducts assure permanent duct banks because Transite is incombustible; is immune to rust and rot; is unaffected by electrolysis; will not slag under action of an arc, and will retain its high original strength.

An unusually smooth bore assures no injury to cable sheath, either in natural movement under load, or when pulling-in cables. Long, lightweight lengths can be quickly and economically installed. In addition, a full line of fittings simplifies even the most complicated of installations.

For full information on Transite Ducts, write for Data Book DS-410. Johns-Manville, Box 290, New York 16, N. Y.

*Reg. U. S. Pat. Off.

How Transite Ducts increase current carrying capacities

Type cable 3 cdr. 500 MCM Compack Sector, 15 KV (6th Edition AEIC Spec.)
No. of cables—3 (all loaded in one bank)
Daily Load Factor—75%
Earth Temp. ambient—20 C

	Transite	Other
Total Therm. Res. to Dielectric Loss (C watts/ft.)	5.66	6.17
Total Therm. Res. to Copper Loss (C watts/ft.)	4.44	4.95
Temp. Rise from Dielectric Loss (C)	1.9	2.1
Allowable Rise for Copper Loss (C)	59.1	58.9
Allowable Watts per ft. cable	4.44	3.96
Allowable Current—(Amps. per cdr.)	386.	365.
Allowable Current—(Relative %)	105.6	100.

Johns-Manville *Transite Ducts* "KORDUCT"— for encasement in concrete

"CONDUIT"— for use exposed and underground without encasement

ELECTRA'S HUSBAND

Where, Oh Where, Has That Salesman Gone ?

A STORY repeated from a recent pitch on salesmanship by a nationally noted sales executive set off a masculine dinner table conversation the other night that brought later criticism from Electra. The story went like this:

A college student found book selling a lucrative form of summer work. This past year along with a children's encyclopedia and a handbook of household hints, including interior decoration and sewing, he had a tome on successful farming in his kit. One day seeing a farmer working on his tractor in a field alongside the road, the lad stopped his car and climbed the fence. He gave the farmer his A-No. 1 sales story — "greatest farm book ever written, all the noted authorities contributed chapters, answers every conceivable question on farming, every farmer should have a copy because he could save time and money, etc., and you'll help me earn my way through college."

"Nope, don't want it," was the farmer's cryptic reaction to the sales story.

"Will you please tell me why?" the college boy asked.

"Well it's this way," the farmer answered. "I don't need any book because I ain't farming now half as good as I know how."

So it seems to be with selling — especially in the electrical industry.

"Trouble with your story," one of the guests said, "is that it doesn't apply to the jobbers' salesmen. They aren't selling at all. During the war and the period of shortages following, they became order takers. Now they have forgotten how to sell. And with business really competitive, they flounder around and their bosses cry about how rotten business is."

"You are too restrictive," another of the guests said. "The jobbers' salesmen aren't the only ones who have forgotten how to sell. The malady runs right across all segments of the business. You know how the contractors have been wailing about poor business. Well we have a device that really meets a new demand on the part of a whole group of customers—theaters, hospitals, hotels, schools, churches auditoriums, night clubs and the like. But it requires a little selling. Well I was telling the head of the contractors' association about its business-building possibilities and he urged me to send the dope to all of the contractors in the area. He even gave me their mailing list to use. So I sent out a letter together with some catalog sheets to the whole list five weeks ago."

"You should have received a nice lot of orders," I commented. "The contractors have been crying for business."

"Are you kidding?" he asked. "How many orders would you guess?"

"Oh, a dozen anyway," I replied.

"Well, I'm still waiting for just a single letter, to say nothing of an order," he continued. "I even went out and talked to a few contractors to see why the deal failed to click. Do you know what they said? They didn't have time! Can you imagine that? They didn't have time to ask a few prospects if they would buy something that was obviously needed."

This isn't a new complaint. For years the industry has striven to find out why the contractor falls down in his selling. Hours of discussion and argument have been wasted at countless conventions exploring this particular deficiency.

"Huh, wait until I tell you about my experience," our second guest interposed. "If you think the contractor is a stinking salesman, you're overlooking the jobbers' salesman. We've a new item that is a natural for contractors, motor shops and industrial maintenance departments. I've plugged it with the wholesalers for months. Several of them list it and a few sales managers have really tried to get their men to push it. But it's no soap.

"The other day one of the sales managers asked me to go out in the territory with one of his old time salesmen. This guy complained that the equipment was too technical for him to sell. So I spent the day with him in the Santa Clara Valley. Do you know what we did?"

"Flopped," the other guest observed.

"No sir," the speaker continued. "We made seven calls and sold four installations that averaged $60 each."

"It certainly isn't like the good old days," our guest mused. "Now when I was traveling a territory way back before the war, I could smell a piece of business a mile away. And we were always plugging some new items. But those days are gone forever, I guess."

"Break it up," Electra grumbled. "We're not going to wait all night to play bridge."

Just a couple of days later one of the guests mailed me an editorial from the *Christian Science Monitor* which had a pertinent slant on this selling problem.

Here is what it said: "Well there's one firm which is not going to take any business recession lying down. It knows that the sellers' market is over . . . the type of salesmanship that permits a customer to buy if he is polite enough not to question the price, reasonable enough not to inquire about a guarantee, and fair enough not to ask for delivery except at the seller's convenience, is not likely to produce a spectacular sales record in this more 'difficult' period.

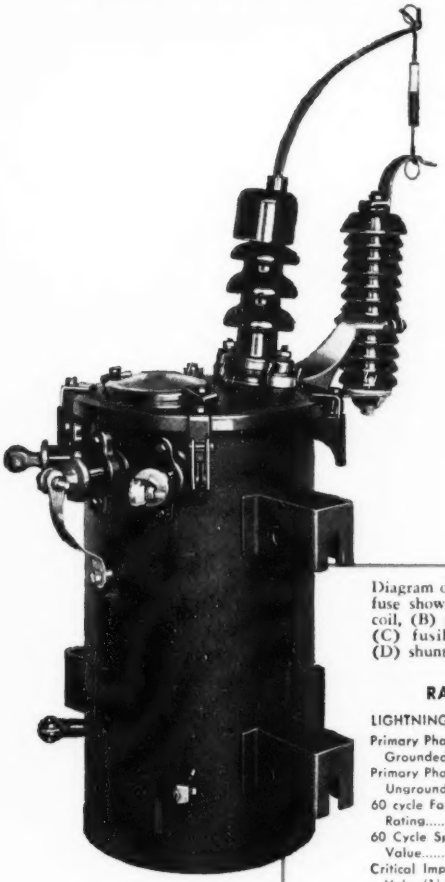
"So the firm advertises for a salesman, according to a United Press dispatch, as follows:

" 'Must be a salesman, expert driver, talker, liar hunter, fisherman, dancer, traveler, bridge player, poker player, golf player, diplomat, financier, capitalist, philantropist, authority on palmistry, chemistry, physiology, dogs, cats, horses, blondes, brunettes, and redheads. A man of vision and ambition, after dinner speaker, night owl work all day, stay up all night and appear fresh the next day. Must be a man's man, a lady's man, a Democrat, Republican, New Dealer, Old Dealer, technician, politician, mathematician and mechanic to represent established chemical manufacturer.'

"To the salesman trained in the postwar boom the demands may seem unreasonable. But to any old hand at the game this advertisement says only that the 'good old days' are coming back—days when a man had to *earn* his salary, and sometimes even had to hustle a bit."

LOW COST Protection

FOR YOUR *RURAL* TRANSFORMERS



Combination Lightning Arrester and Overload Limiter provides Complete, Low-Cost Protection on Allis-Chalmers Rural Distribution Transformers

COMPLETE PROTECTION for your rural transformers need not be economically out of reach — even on low revenue feeders.

Allis-Chalmers Rural Transformers with combination Lightning Arrester and Overhead Limiter offer as complete protection as you can buy . . . at a saving over many other types because of its simple, thrifty operating principle. By using this arrangement you can economically justify complete electrical protection for all transformers on your system.

SURGE-PROOF OVERLOAD LIMITER

An important feature of this protective combination is the surge-proof overload limiter. Through special two-element fuse design, fuses rated small enough for low sustained tripping values can at the same time withstand momentary load current surges equal to ordinary fuse links rated 4 to 8 times higher! This provides protection against secondary shorts and harmful overloads, eliminates costly and unnecessary storm outages — yet permits safe, efficient utilization of Allis-Chalmers rural transformer overload capabilities.

The protected transformer comes to you completely assembled as a packaged unit, ready to install.

For further details, write for Specification 2557, or call your nearby A-C sales representative.

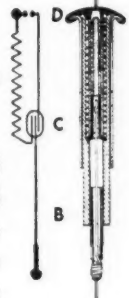


Diagram of two-element fuse shows (A) heater coil, (B) pull out wire, (C) fusible junction, (D) shunting gap.

RATINGS

LIGHTNING ARRESTER

Primary Phase to Phase Volts, Grounded 9000-13800
Primary Phase to Phase Volts, Ungrounded 6000-9000
60 cycle Fault Current Rating..... No Limit
60 Cycle Sparkover Value..... 34 KV
Critical Impulse Sparkover Value (1½x40 wave) 54 KV

OVERLOAD CUTOUT

Current Rating..... 50 amps
Maximum Interrupting Capacity ..... 1200 amps

A 2795

ALLIS-CHALMERS, 939A SO. 70 ST.
MILWAUKEE, WIS.

A-C ALLIS CHALMERS

ALLIS-CHALMERS

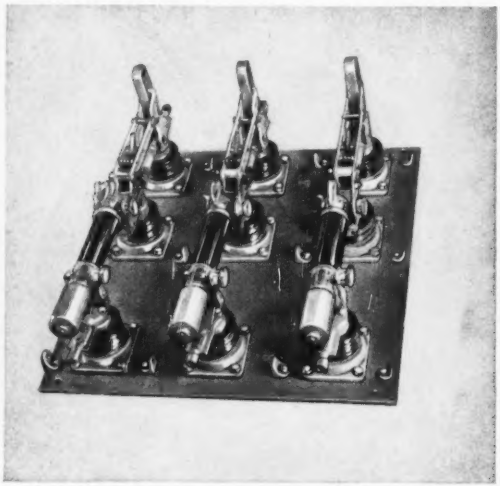
The THRIFTY SWITCH

It is no longer necessary to use expensive oil switches or circuit breakers to perform many high voltage switching operations. The new Three E Air Interrupter Switch capable of performing these operations has been thoroughly tested in laboratory, as well as in actual service, before being offered to the electric power Industry.

Here is some of the things it will do:

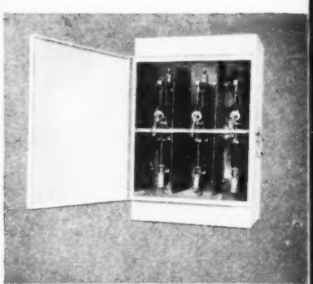
1. **Open full rated load current at full rated voltage of switch.**
2. **Open magnetizing current of transformers.**
3. **Open charging current of buses, lines and cables.**
4. **Open exciting current of feeder regulators.**
5. **Sectionalize feeders and distribution circuits.**
6. **Switch charging currents of capacitor banks.**

In the opening operation of this type of switch, the arc is confined and interrupted in an arcing chamber by gases produced by action of the arc on solid material. No oil, air blast or other medium is employed. Furthermore, the switch when open provides a visible air gap. When it is reclosed the arcing contacts close first and the switch automatically resets for the next opening.



3 P.S.T. 400 ampere 7500 volt type GF 1W-1 Switch and Power Fuse less operating mechanism and barriers.

When combined with power fuses as illustrated herewith it provides an inexpensive means not only for non-automatic circuit switching but also for overload and short circuit protection.



Same equipment with operating mechanism and barriers, metal enclosed.

Bulletin 141 lists indoor air interrupter switches up to 600 ampere and 15000 volt. Send for it.

THREE E — ELECTRICAL ENGINEERS EQUIPMENT CO.
MELROSE PARK, ILLINOIS

OCTOBER 1949 Vol. 103, No. 4

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

Pouring heat from induction electric brass furnace at the new plant of Revere Copper & Brass Co. at Los Angeles

Western Industry Expands Rapidly

PROOF that industry in the Far West expanded more rapidly than in the U. S. as a whole is contained in the figures recently released by the Bureau of the Census. For the first time since 1939 there has been a Census of Manufactures with figures covering the year 1947.

In a comparative study of 1939 and 1947 completed by the 12th District Federal Reserve Bank the state-by-state differences in the structure of Western industry are clearly shown. The rise in heavy industry is clearly defined. Here is what the study says about what happened in the West:

"Forty per cent more people were living in the 12th District in 1947 than in 1939; 80% more people were employed as production workers in manufacturing plants; 48% more plants were in operation; and the workers in the plants added 253% more value to their products than in 1939. The nationwide increases were considerably smaller (Table 1). It must be pointed out that a large part of the enormous increases in value added by manufacture is due to the fact that the price level in 1947, as measured by the index of wholesale prices, was nearly double that of 1939.

"In 1947, 971,000 people (6.6% of all the manufacturing employees in the country) were working in 12th District manufacturing plants, and earned nearly $3 billion, 7.5% of all manufacturing salaries and wages. The average production worker (about 80% of the total number of manufacturing employees are engaged in actual production work) earned $2,860 in the district, compared with $2,538 in the nation.

"The census figures provide us with four different measures for determining the importance of the various manufacturing industries: number of employees, salaries and wages, value added by manufacture, and number of establishments (see Table 2). In the 12th District, the food and kindred products industry has maintained a consistent lead in each of these categories. In 1947, 19% of the district's manufacturing employees were working in food processing plants, and drawing 17% of the total wages and salaries earned in manufacturing. Lumber was the next most important industry in both years in most categories. Because of the nature of lumber manufacturing, a larger than av-

Table 1—Census of Manufactures by State and Area—Twelfth District

	Number of establishments (units)			Average number of production workers (in thousands)			Value added by manufacture[1] (in millions)		
	1939	1937	Per cent increase	1939	1947	Per cent increase	1939	1947	Per cent increase
Arizona	313	545	74	5.9	11.2	90	$ 31.6	$ 104.0	229
California	11,558	17,645	53	271.3	529.8	95	1,122.5	3,996.2	256
Idaho	498	664	33	9.9	14.6	47	29.8	109.7	268
Nevada	94	125	33	1.0	2.0	100	11.5	27.6	140
Oregon	1,903	3,075	62	57.5	92.0	60	156.7	673.0	329
Utah	549	773	41	11.5	20.0	74	43.3	128.7	197
Washington	2,858	3,407	19	82.3	122.8	49	267.7	871.8	226
Twelfth District	17,773	26,234	48	439.4	792.4	80	1,663.1	5,911.0	255
Mountain	1,454	2,107	45	28.3	47.8	69	116.1	370.0	219
Pacific	16,319	24,127	48	411.0	744.6	81	1,547.0	5,541.0	258
United States	173,802	240,801	39	7,808	11,918	53	24,487	74,364	204

[1] Value added by manufacture is computed by subtracting cost of materials and supplies from value of shipments.

Note: Figures will not necessarily add to totals because of rounding.

Source: U. S. Department of Commerce, Bureau of the Census, Census of Manufactures Statistics by States, and Pacific and Mountain Divisions, 1947.

Table 2—Census of Manufactures Statistics by Most Important Industry Groups—Twelfth District, 1939 and 1947

	1939			1947					
					All Employees		Production and Related Workers		
	Number of establishments (units)	Number of production and related workers (in thous.)	Value added by manufacture (in millions	Number of establishments (units)	Number (average for year) (in thous.)	Salaries and wages total (in millions)	Number (average for year) (in thous.)	Wages total (in millions)	Value added by manufacture (in millions)
Food and kindred products	5,261	103.5	$ 417.1	4,832	182.3	$ 516.7	145.0	$ 373.3	$1,222.3
Lumber and products except furniture	1,822	100.5	239.3	3,880	140.6	450.7	133.2	403.7	925.3
Transportation equipment	286	32.1	117.1	712	136.4	440.0	106.3	318.8	641.3
Metals (primary and fabricated)	1,421	40.5	156.9	2,715	110.0	351.4	92.8	275.6	649.5
Machinery (including electrical)	1,165	20.0	90.6	2,403	81.9	258.9	63.6	187.2	449.3
Printing and publishing	2,784	22.2	136.9	3,264	57.8	193.9	33.1	110.3	353.7
Other	5,034	119.3	493.8	8,428	259.2	770.9	218.5	598.1	1,669.7
Total all industries	17,773	439.3	$1,663.2	26,234	970.6	$2,982.6	792.4	$2,266.6	$5,911.0

Note: Figures will not necessarily add to totals because of rounding, and because in some cases figures were withheld to avoid disclosing individual operations.

Sources: U. S. Department of Commerce, Bureau of the Census, Census of Manufactures Statistics, Pacific and Mountain Divisions, 1947.

erage proportion (95%) of the industry's employees are engaged in actual production work, and consequently, although the lumber industry paid out less in total salaries and wages in 1947 than the food products industry, it paid more in wages alone. The transportation equipment industry passed the metals industry to reach third place in terms of number of employees and salaries and wages in 1947, though the metals group was still ahead of it in terms of value added.

"In the United States, the machinery industry was the most important manufacturing industry in 1947, in terms of employment and value added by manufacture. Metals and food processing were second and third. In 1939, the metals industry had been the most important in these two categories, followed by the food products and machinery industries in terms of value added, and by textile mill products and food products in terms of number of production workers.

"The four Intermountain states experienced a greater increase in manufacturing activity than did the rest of the nation, but the increases in the Pacific Coast states were more striking. California overtook Massachusetts to reach seventh place in the grouping of the ten most important manufacturing states in terms of value added. In accomplishing this feat it had grown faster than any of the other nine states, in terms of both employment and value added. It employed 4.5% of the nation's production workers in 1947, compared with 3.5% in 1939. Its share of the total number of manufacturing plants in the country increased by 9% from 1939 to 1947, reaching 5.4%. Only New York has more manufacturing plants than California."

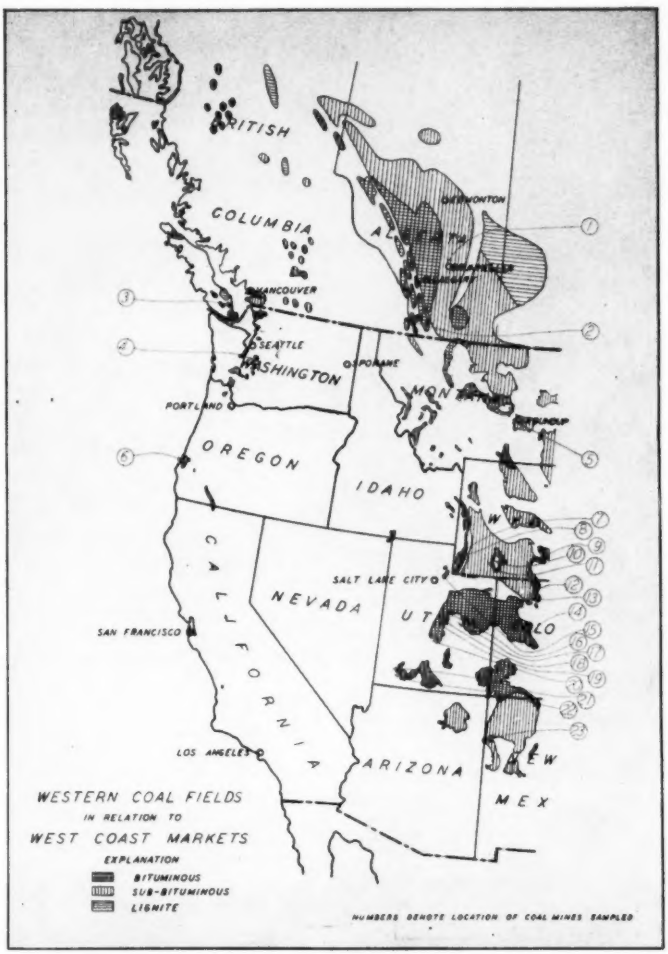
The survey showed that all industries in the states covered expanded between 1939 and 1947. Most spectacular gains were in transportation equipment, principally because of aircraft manufacture, even though the postwar cutbacks had been substantial. The gain was 450% as compared to 230% for the U.S. Second and third industries in terms of both employment and the value added by manufacture were in the machinery and metal industries. Here again the wartime expansion was largely responsible, because it provided the raw materials on which such industries are based.

In relation to national employment the food processing industries with close to 150,000 workers in this region head the list with 13.2% of all U.S. employment in this field. Employment in the lumber industries, while showing a substantial gain in total workers, slumped from 23.8% of the national total to 22.2%. The region provided employment in 1947 for 10.8% of all workers in transportation equipment, 5.1% in primary and fabricated metals, 3.4% in machinery and 4.4% in apparel manufacture.

Available Coal for Western Steam Plants

THAT coal eventually will supplement the supply of natural gas and oil for certain West Coast steam plants seems to be a certain development of the unforeseeable future. This is the recently expressed opinion of Claude P. Heiner, president of the Utah Fuel Co., Salt Lake City. The history of fuel utilization on the Pacific Coast indicates that substantial quantities of coal fuel with a wide range of burning characteristics were used up to about 1917 but, with the development of gas and oil reserves and water power, the use of coal for industrial fuel has all but vanished. In the event of partial failures of other forms of fuel to supply the energy needs of the Pacific Coast, there is an abundant supply of good coal with a fairly wide range of burning characteristics available in the nearby Intermountain area, in the Pacific Northwest and from Alberta and British Columbia.

The accompanying map shows the general location of Far Western coal fields. These are assumed to be the future principal sources of coal for West Coast steam plants. Identifying arrows point to mine locations sampled. Samples have been analyzed and a complete report prepared showing characteristics. B.t.u. ranges from 9,310 for location 1 (Alberta) to 12,385 for No. 14 (Colorado). Ash softening temperature varies from 1,800°F for No. 11 (Wyoming) to 2,520°F. No. 18 (Utah). Wyoming coals are generally of higher moisture content than Utah coals. Similarly, a number of other Western coals have high moisture content. Beneficiation of these coals by heat drying gives promise that eventually much lower moisture values will be obtainable than from the raw coals. Freight saving is obvious. Also, many of these Western coals are amenable to modern mechanical cleaning where there is need for it. This will result in a substantial reduction of the ash and sulphur content of raw coal to make a more desirable fuel from both cost and performance standpoints.

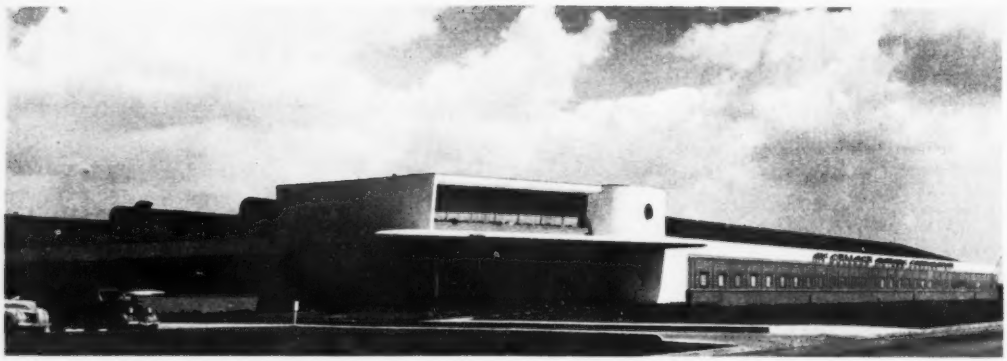


Coal reserves believed to be sufficient for extensive use by West Coast steam plants are fields 1, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 19, 20, 21, 22 and 23. At locations 3, 6 and 15, reserves or other conditions are believed unfavorable. Coal at locations 2 and 17 is coking coal. Since the reserves of Western coking coals are limited and it is believed that they should be mined only for coking and metallurgical purposes, they are not available for steam plants

Other Coals Not Considered

Australian coal cannot be assumed to be an important supply. It is understood on good authority that the fuel needs of Australia and the South Pacific require all its local supply. This is also true of New Zealand. The coal supply of western South America is relatively remote from its coast and no adequate transportation facilities exist at the present. In addition, considerable amounts are imported. Alaskan reserves, while extensive, are of generally inferior quality or extremely high in cost. Mechanical preparation probably would solve the quality problem, but difficulties in mining remain to make the cost of extraction to seaboard excessively high.

Figures show that Virginia coal shipped through the Panama Canal layed down on the Pacific Coast would cost $18.14 per gross ton, or 55 cents per million B.t.u. Of this, $8.50 is for ocean transportation. This cost of $18.14 can be shown to be excessive in comparison with coals available from the Rocky Mountain areas. Thus, Western coals are the only ones considered available for future power generation in this area.



McCulloch Motors Goes All-Electric

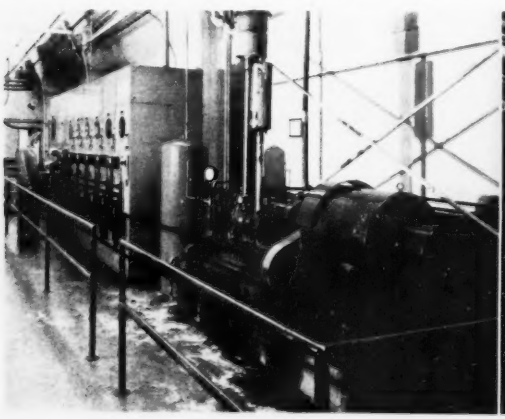
Louis B. Reed

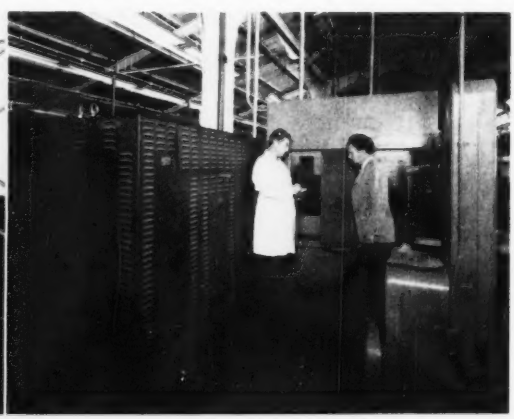
Los Angeles Department of Water & Power

ONE of the most completely electrified industrial plants to be found on the West Coast is that of the McCulloch Motors Corp. occupying a nine-acre site near the Los Angeles airport. Everything is electrically operated from the smallest automatic tool to a 39-ft. long push-button-operated Venetian blind in the owner's office. McCulloch Motors build gasoline engines ranging from a ½-hp. 8-lb. engine, used by paratroopers for driving the generators of their radio equipment, to an opposed piston type of engine, which develops 30 hp. Their products are designed to give as much horsepower per pound as possible. They also build a gasoline engine chain saw and are introducing a new portable pump that weighs only 51 lb., but can handle 15,000 gal. of water per hour. This diversification of product calls for many diversified operations.

Electric service is provided by the Los Angeles Department of Water & Power at 34.5 kv. This is stepped down to 2,300 volts for power and 480 volts to feed dry-type lighting transformers. H. M. Eversz, maintenance superintendent of the plant, designed the electrical layout utilizing a system of load centers. The 2,300-volt line is fed underground to six load centers, where it is stepped down to 240 volts, three phase by 200-, 300- and 450-kva. dry-type transformers. Distribution to the various machines is via Trumbull Flex-A-Power duct. Thus, any machine may be moved readily to facilitate new production line setups, a necessity where a plant is designed for high production on more than one product. Lighting distribution is at 480 volts, single phase, and stepped down at various load centers by 25- and 37.5-kva. transformers to a 120/240-volt, 3-wire system. Lighting is almost 100% cold

Main 2,300-volt distribution board at left background serves six load centers such as the 450-kva. installation shown in view at right. Load centers step down to 240 volts, three phase for power distribution through bus duct



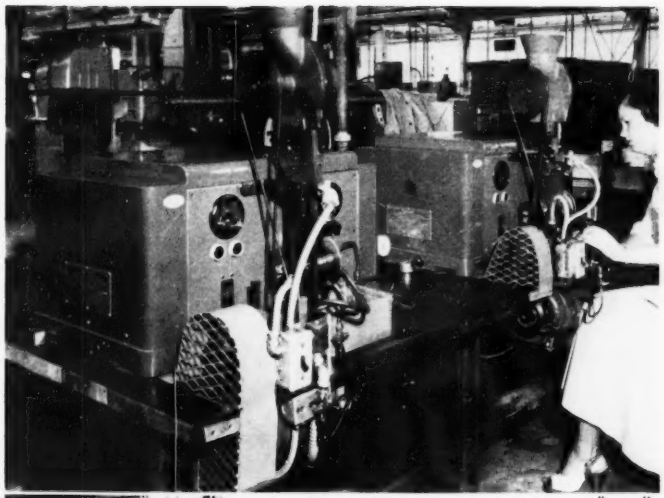


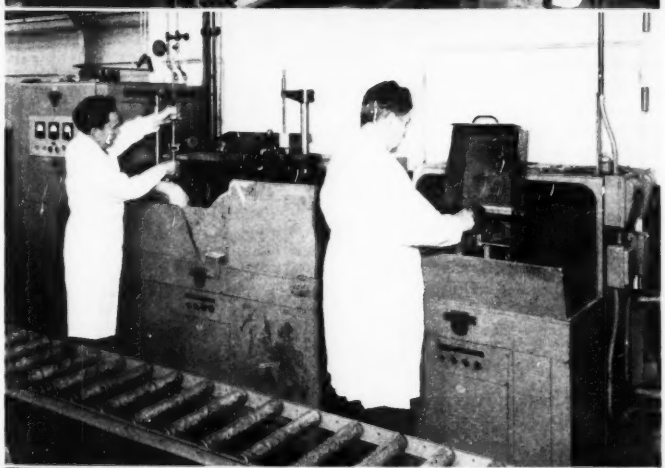
cathode, with the layout based on recommendations made by Department of Water & Power illuminating engineers.

Electric Heating

No provision was made for cooling the air, since the plant is located near the ocean. Heating in the plant area is provided by the five 50-kw. Chromalox centrifugal unit heaters. Air for the offices is heated to 68° by 90 kw. of strip heaters before distribution. From here the air is divided into four ducts, three going to the general office, where 48 kw. of strip heaters maintain the thermostatically controlled temperature. The fourth duct supplies a series of individual offices with the 68° air, which is heated to individual taste by 3 kw. of strip heaters at each outlet. McCulloch's office suite is kept at a constant temperature with an "Airtopia" air conditioning unit. Water heating in the plant is accomplished with two 7-kw. water heaters.

From the description of the building heating, it is evident that McCulloch Motors is electrical-minded. That becomes more evident as one tours through the plant. There is a considerable demand for molten aluminum since practically every metal part is diecast. When the plant was first built, it was impossible to get electric furnaces, so gas furnaces were installed. These were replaced as soon as possible by five Ajax 60-cycle induction furnaces. This gave management an excellent chance to compare the operation of both types. Naturally, working conditions were considerably improved by the change, since with the electric furnace all heat is generated in the metal itself. The only extraneous heat is that radiated from the surface of the





Induction heating is widely used at McCulloch Motors. Upper view shows two 750-watt Thermonic induction heaters for heat-treating pins used in saw chain. Cycle is entirely automatic. Each machine has capacity of 20 pins per minute. At center is seen a 25-kw. Thermonic high-frequency two-station unit used to heat-treat crank shafts. Lower picture shows a 20-kw. Ajax, 60-cycle induction furnace used for holding the molten aluminum at each diecast machine. Molten metal in a U-shaped channel below holding chamber forms a one-turn short-circuited secondary so that all heat is developed in the metal itself. Stirring action necessary to keep metal in homogeneous state is supplied by magnetic stirring action. Stirring occurs below surface of metal without breaking surface film. This minimizes losses due to oxidation

Cold cathode lighting was used practically 100% through plant. At left is view of office lighting. General view at right shows cold cathode lighting and Trumbull Flex-A-Power duct for greater flexibility in locating the machines

molten metal. This benefit is apparent, but what is more important is the improved quality of the metal and the savings in dross.

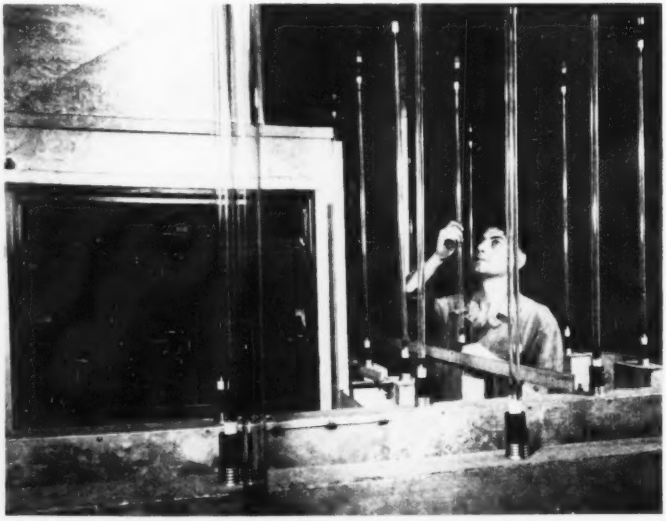
Heat-Treating

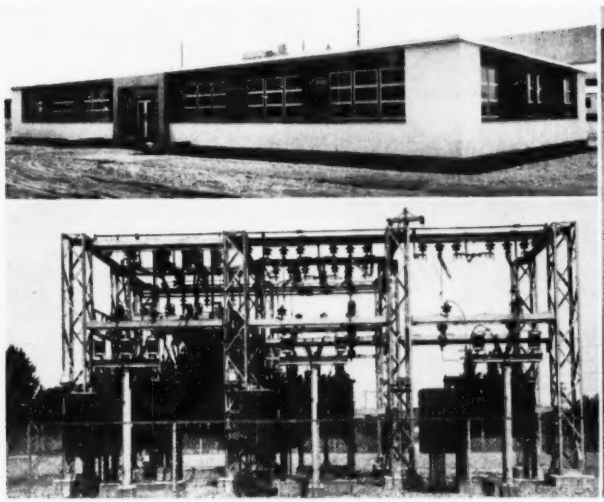
Proper heat-treating of a crankshaft is very important. To insure the best in heat-treating, a 25-kw. Thermonic high-frequency induction unit is used. In another application of high frequency, two small 750-watt units heat-treat the rivets used to make up the cutting chain of the chain saw. The rivets are poured into a hopper, automatically fed into the coil, and heated and quenched at the rate of 20 per minute. Another application is the infrared oven. This 60-kw. oven is hung from the ceiling (see front cover picture) where it saves floor space. But unlike any normal oven, it is placed on the conveyor line ahead of the paint booth. They have also found that by heating the paint before spraying, a heavier coat can be applied. Then, too, the results are always consistent without adjustments being made to paint mixtures and equipment due to weather conditions. A Vicon paint heater is also used, which is rated at 1,500 watts.

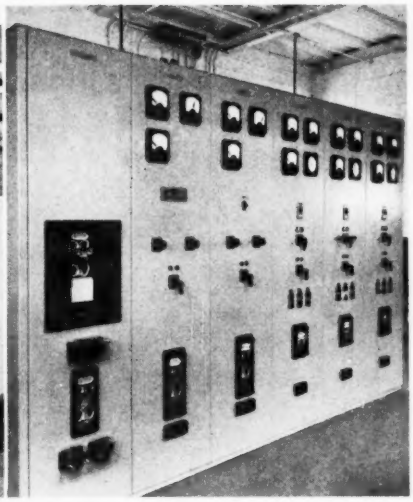
These are the highlights of the electrical features of McCulloch Motors. The plant, built for production, is justifying itself with daily engine output of up to 350 complete units. Electrical contractor was Herbert Parsons.

Sterilamps Purify Air

Clean germ-free air is provided for office workers at Western Crown Cork & Seal Corp.'s new San Francisco plant by an extensive installation of Westinghouse sterilamps in the air ducts, a unit of which is here shown. A total of 92 sterilamps irradiate 30,000 cu. ft. of air per minute in three air ducts. Germ-killing ultraviolet radiations of the lamps are concentrated as a wave length of 2,537 angstrom units, which is the specific bactericidal region of the light spectrum, and far below the 4,000 angstrom unit wave length of visible violet light. Tests have shown that such lamps will kill approximately 99.5% of all air-borne bacteria passing within their effective range. Lyle Patton was electrical engineer on the job.







Glimpse of facilities at new plant of The Carborundum company, Vancouver, Wash. Back of office building in top view may be seen some of plant buildings. At center is switchgear for incoming high-tension lines. Lower view shows main switchboard. Silica, carbon, sawdust and salt are reduced in electric furnaces to make silicon carbide

CARBORUNDUM MOVES WEST

AVAILABILITY of electric power, proximity of raw materials and the desirability of having facilities conveniently located to serve the abrasive and refractory needs of growing industries in the West, influenced the Carborundum Co. to locate a new plant at Vancouver, Wash. The new plant, located on a 99-acre site adjacent to the Port of Vancouver Terminal No. 2, will augment the company's supply of silicon carbide or Carborundum. This is one of the basic abrasives used in the manufacture of grinding wheels, sharpening stones, coated abrasives, other abrasive products and refractories. The plant is one of the most modern of its kind anywhere in the World.

Designed to permit continuous material flow, the mix building is the center of the first cluster of buildings. The raw materials, silica and carbon in various forms, sawdust and salt are stored as received, to be readily available and then processed in facilities adjacent to the mix building. After processing and preparation for use, materials are stored in final form in high bins atop the mix building. The flow is by gravity through the various stages of weighing and mixing to the mixer on the ground floor. All equipment is fully automatic, electrically operated and push-button controlled, designed to permit maximum efficiency and freedom from dust in operation.

The electric furnace plant incorporates many new features. Spacious and well-ventilated, it is designed to provide the best possible working conditions. It is built of welded steel construction 100x150 ft., and houses batteries of large silicon carbide electric furnaces for the main step in the process. These furnaces are of the resistor type, passing current through a furnace core connected to electrodes in the heads at each end of the furnace. Power* for furnace operation is obtained over high-tension transmission lines to the plant. Step-down transformers equipped with voltage control provide proper service for furnace operation.

The passing of electrical energy through the furnace results in high temperatures in the combination of the silica in the mix with the carbon present to form silicon carbide. The silicon carbide exists in a glistening ring of dense, and at times, colorful crystals around and throughout the length of the furnace core. Upon cooling, the ring of silicon carbide crystals is broken up and loaded into buckets, then conveyed through jaw crushers to further crushing and grading operations preparatory to storage and shipment. This completes the process of manufacturing done at the Vancouver plant.

The Carborundum silicon carbide produced here, as well as that from other crude silicon carbide plants of the Carborundum Co., is shipped to abrasive and refractory plants throughout the world where it is fabricated into thousands of abrasive products, refractories, and other products required by modern industry.

Buildings and facilities were designed with a view to possible expansion in the future. This is but the first of the plants which the Carborundum Co. hopes to build in Vancouver. The Nicholson Co. Inc. and the Chemical Plants Division of the Blaw-Knox Construction Co. did the engineering and construction job under direction of the Carborundum Co. The accompanying photographs are the only ones released by the Carborundum Co. for publication, and unfortunately do not show the electric furnaces and other electrical details.

* Power requirements are unofficially understood to be about 15,000 kw.

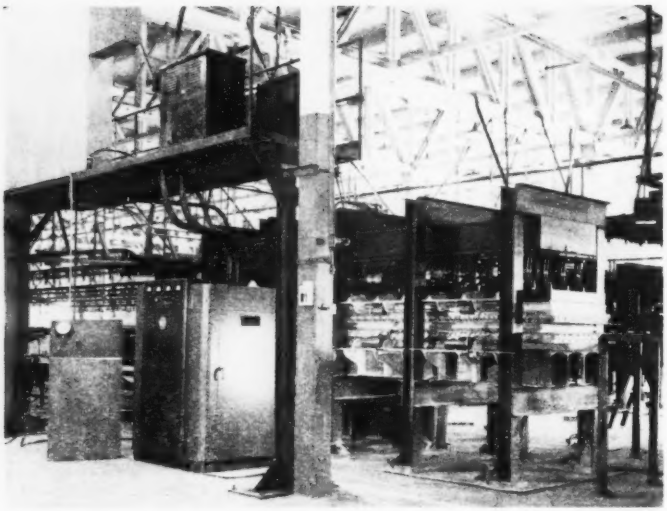


Fig. 1

HF Gluing Now Accepted Practice

E. S. Winlund
Allis-Chalmers Mfg. Co., Seattle

HIGH-FREQUENCY generators for gluing wood have grown steadily in use on the Pacific Coast despite protracted national growing pains. General skepticism of electronic equipment as an industrial tool has about ceased. Generally, potential users in the furniture and lumber industries no longer have to be shown that HF gluing is a very practical thing.

High-frequency dielectric heating generators are now available with power outputs of 1/10 to 125 kw. drawing 60-cycle line powers of ½ to 250 kw. Output frequencies range from 2,000,000 to 200,000,000 cycles per second. Typical medium-power equipment draws about 35 kw. at 90% PF from the 60-cycle line, and delivers 15 kw. at 2,000,000 to 10,000,000 cycles to the glue lines being heated. Because of the much greater electrical conductivity of the glue lines, as contrasted with that of the wood, the glue temperature naturally rises, reaching about 200°F. This completely sets a modern resin glue in the order of 20 sec., without appreciable heating of the wood. Thus very little power is wasted in heating the wood.

Prefabricated Housing

Typical of a modern installation is that shown in Fig. 1, at the General Panel Corp., Burbank, Calif. High-frequency equipment was chosen by performance competition between three suppliers. At left-center in the photograph is the RCA (now sold by Allis-Chalmers) 15-kw. HF generator. Back of it is a special press with a bed 17 ft. long x 40 in. wide. Behind this press are three more presses, 14 ft. x 40 in. each, fed by this and other HF generators not visible.

This installation is capable of bonding two ¼-in. thick plywood panel "skins" simultaneously, each to one side of wooden framework, to make up 40 in. x 8 ft. 6 in. prefabricated house window, door, and wall sections. The 15-kw. generator handles two such wall (solid) panels in 75 seconds, or other panels in less time. More recently the installation has been used for the manufacture of "flush" doors, bonding plywood panels simultaneously onto both sides of a door skeleton framework.

Chest Sides and Doors

Similar but smaller facilities are arranged expressly for flush doors and chest-sides, particularly in the furniture industry. A chest-side is the vertical side of a bedroom chest or dresser. It is usually made of plywood glued to a wooden skeleton that incorporates the drawer guides. A 15-kw. output HF generator will handle two average chest-sides, or four small doors, simultaneously, in the order of 15 to 30 seconds.

Curved Plywood

Use of curved or "molded" plywood in furniture manufacture has increased considerably in the last few years. Applications include the Eames chairs, plywood screens, modern desks, and particularly components of bedroom furniture. Typical of these is the installation at the Los Angeles Period Furniture Co., perhaps the largest manufacturer of bedroom furniture in California, shown in Fig. 2. At the left in the picture is an RCA model 15BM high-frequency generator, which delivers 15 kw. at 7.5 megacycles. Directly in back of it is press No. 1 (marked 55-1), and behind that press No. 2, (marked 55-2).

The die sets, called "forms," are mounted between the platens of each press. Each press is surrounded by a copper screen cage to prevent radio interference. The front and back of each cage is easily removable for change of form sets. At the upper right side of each cage can be seen automatic tuning control units, designed by the writer. These automatically tune each new load to predetermined generator power output. That power is then held within 5% even though the rising temperature of the load would otherwise detune the load. Without these units, three men would be required, instead of two, to operate the installation at full 15-kw. capacity. The automatic tuning control units have only the timers, power output meters, (both visible at top), and "on" and "off" buttons available to the operators. High-frequency power is fed from the generator to press No. 2 via the aluminum coaxial (square) transmission line above the men's heads.

A close-up of press No. 1, with the cage front removed, is shown in Fig. 3. The back of the generator is just seen at the extreme left side. A high-voltage, high-frequency double-pole double throw transfer switch is mounted

on the back of the generator. Its magnetic mechanism is enclosed in a metal box to exclude HF currents. The contacts, on ceramic insulators, are visible outside the box. The heavy coil in front of the transfer switch is part of the high-frequency coupling network for press No. 2. The transfer switch connects one press "hot" electrode to the generator "tank," while *grounding* the "hot" electrode of the other press to prevent accidents in the press being reloaded. This transfer switch is controlled automatically by the automatic tuning system.

At the center is a typical set of forms to make a 30-in. x 60-in. x 13/16-in. curved plywood panel. The 1/8-in. aluminum "false" electrode surfaces easily visible are each backed by 1/8-in. veneer. Back of this are the "actual" 1/16-in. thick aluminum electrodes. By this arrangement, dielectric heating of 1/8-in. veneers keeps the 1/8-in. aluminum faces hot, thus insuring uniform temperature in the load layup. The form itself is made up of solid laminated softwood plywood, held in position by clamps and brackets as shown.

To the extreme right, visible through the space between electrodes, is the load tuning inductance, designed by the writer. These units provide three variable high-current inductances in one compact enclosure. They may be connected in combination of series-parallel to resonate a wide range of loads. They have no sliding contacts to get hot or wear. This was a primary difficulty with the previously used parallel line stubs. These units are motor-operated automatically by the automatic tuning control units.

A gluespreader and layup table are normally located in the foreground of Fig. 2 (but were moved away for the picture). Seven plys of veneer are layed up on the table, with softwoods (fir, etc.) for the center five, and fine-grain hardwoods (mahogany, oak, ash, etc.) for the outer two. Glue is spread on both sides of three of the plys. This layup (sometimes two or three at once, side by side) is placed between electrodes and the hydraulic press closed. High-frequency power is applied for two minutes. The panel is then kept under pressure for one minute without HF power. Then another minute is used to open the press, remove the completed panel, insert a new layup, close the press, and again apply HF power.

As soon as the two-minute HF application period is completed on one press, HF power is automatically switched to the other press for a two-minute period, the other press having "cooked" and been reloading during the two minute HF heat on the first press. Thus it will be seen that the generator is almost continuously loaded, and the operators kept quite busy. Normally, two different panel shapes are in production simultaneously this way. When the panels are removed from the press and have cooled, they are usually sawed lengthwise into matching drawer fronts for bedroom chiffoniers, dressers, tables, etc.

Economy

Before installation of the high-frequency equipment, such panels had to be made seven at a time, clamped overnight between male and female forms and six intermediate cauls. These form-and-caul sets cost $1,200 to $4,200, and quite a number of sets were required to handle required production overnight. In the present installation, a form set costs $300 to $400, including material, labor, and some overhead. Only *one* set is required for each desired panel shape. Panel sizes range from 24 in. x 28 in. to 30 in. x 60 in., nearly always 13/16-in. thick. Production lots run in order of 1,000 of a given panel shape.

The primary advantages of the HF installation are (1) more panels per man-hour of cost, and (2) less material waste per panel. These are reflected in the fact that the best competitive price obtainable (from concerns who make a principal business of making curved plywood panels for furniture manufacturers) was 42% above the cost at Los Angeles Period Furniture Co.

New Applications

When considering the application of high-frequency heat to solve a problem, one must never fail to ask, "Will it save handling time?" The key to successful electronic application is *not* how fast it will heat, but rather how easily mechanical advantage may be taken of the much faster electronic heat.

There are approximately 800 to 900 kw. (generator output rating) of installed high-frequency gluing equipment in use on the Pacific Coast. Developments are in progress which, if successful, will lead to perhaps an additional 1,500 to 4,000 kw. within the next several years. Most current installations are used for edge gluing of lumber, to make wide boards from narrow strips. However, it is anticipated that the greater part of future installations will be in the plywood and lumber industries.

Fig. 2

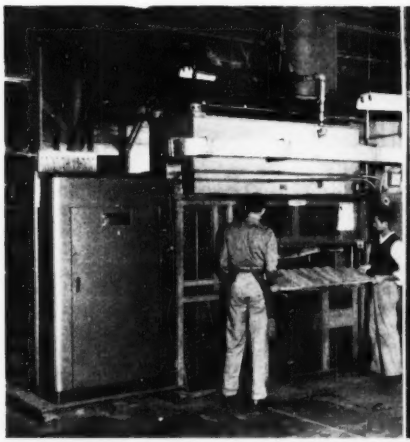
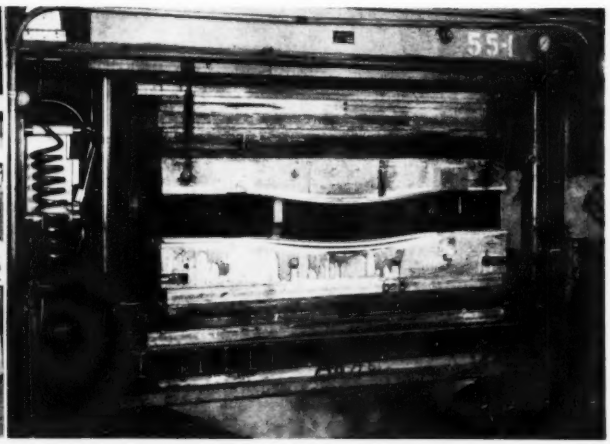


Fig. 3



Westvaco's new $4,000,000 electric furnace plant at Pocatello, Idaho, for the production of elemental phosphorus. One 17,500-kw. furnace is now in operation. A second similar furnace is scheduled for completion early in 1950

Phosphorus From Idaho Shales

THE first electric furnace for the production of elemental phosphorus west of the Mississippi River, went into operation at Pocatello, Idaho, in July. The four-million-dollar plant presently having one 17,500-kw. electric furnace was built by the Westvaco chemical division of the Ford Machinery and Chemical Corp. A second plant unit being built at the same cost and containing a similar furnace is scheduled for operation the first of next year. To serve the new 35,000-kw. phosphate load, Idaho Power Co. built a 138-kv. transmission line to the plant and installed a 37,500-kva. substation.

Idaho has approximately 85% of the nation's supply of phosphate. The beds are located in the southwestern part of the state, which explains Westvaco's purchase of a 500-acre industrial site near Pocatello and the construction of electric furnaces. In the past the bulk of the phosphate ore has been mined for conversion into commercial fertilizers for both domestic and foreign consumption. While that will continue to be a major factor in the phosphate industry in Idaho, the production of elemental phosphorus from phosphatic shales of the region promises to be one of the important industries of the Intermountain region in the future.

Principal mining activity is located about 31 miles northeast of Pocatello on ground leased from the Department of Interior through the Fort Hall Indian reservation. The open-pit mine, served by a new $1,300,000 Union Pacific railroad branch, has a present production capacity of 5,000 tons of high-grade ore a day. This does not include the overlying shale deposits which are not suitable for acid conversion into fertilizer. These shale deposits are of a peculiar and uniform quality that lend themselves particularly well to electric furnace reduction for the production of elemental phosphorus. Elemental phosphorus is widely used in the food, chemical and drug industries. Having such use for phosphate shale is an advantage to the fertilizer business, as the overlying shale deposits must be removed before the phosphate ore can be mined.

Chemical Reaction

The chemical reaction employed in making phosphorus is fundamentally simple. In the raw material, the phosphorus is locked up in the compound, tricalcium phosphate, in which two atoms of phosphorus are combined with three of calcium and eight of oxygen. In the reaction, the calcium combines with silica and the oxygen combines with carbon, thus liberating phosphorus. To bring about this reaction, it is only necessary to create an intimate mixture of phosphate rock, silica and coke and to get the mixture hot enough.

A considerable part of the plant is devoted to preparation of furnace charge. Stockpiles of phosphate rock, coke and silica are maintained. It is necessary to dry each of these charge components, since water entering the electric furnace has a detrimental effect, both chemically and physically. Consequently, there is a dryer for each raw material and, in the case of the coke, crushing and screening takes place to produce several sizings. The charge for the furnace is prepared to specification, using automatic proportioning devices. It is then introduced into the furnace by gravity feed, the furnace accepting charge as it is required.

The phosphorus formed in the reaction is converted to vapor. This vapor along with carbon monoxide formed in the reaction escapes through an outlet pipe, then passes through an electrostatic precipitator where any entrained dust drops out. The vapor is then condensed by water spray and the liquid phosphorus collected in a catch tank. The carbon monoxide is collected and used as a fuel in the dryers. Periodically the phosphorus is measured and withdrawn into storage tanks, from which it is loaded into tank cars. Whenever liquid phosphorus exists, it is kept under a layer of water to prevent contact with the air, since it combines with oxygen so freely that it will burst into flames spontaneously if exposed to air. Therefore, air-tight railroad tank cars are used.

Heart of the operation is the electric furnace. It is massive and rugged, yet simple in construction. Chemicals of the furnace charge are extremely reactive at the 3,000°F temperature of the furnace. The corrosive and erosive effect of the unmelted charge, and of the molten slag and ferrophosphorus, present serious problems in furnace design. The dome of the furnace is made of ceramic refractory materials and the hearth is built of carbon blocks, surrounded by brick and cooling coils.

Heat required is generated by using the furnace charge as the resistor. Current flows through three carbon electrodes, each over 36 in. in diameter. Electrodes are gradually consumed, and thus a mechanism is arranged to lower electrodes as required. The electrodes are held in water-cooled collars, through which electrical contact is established.

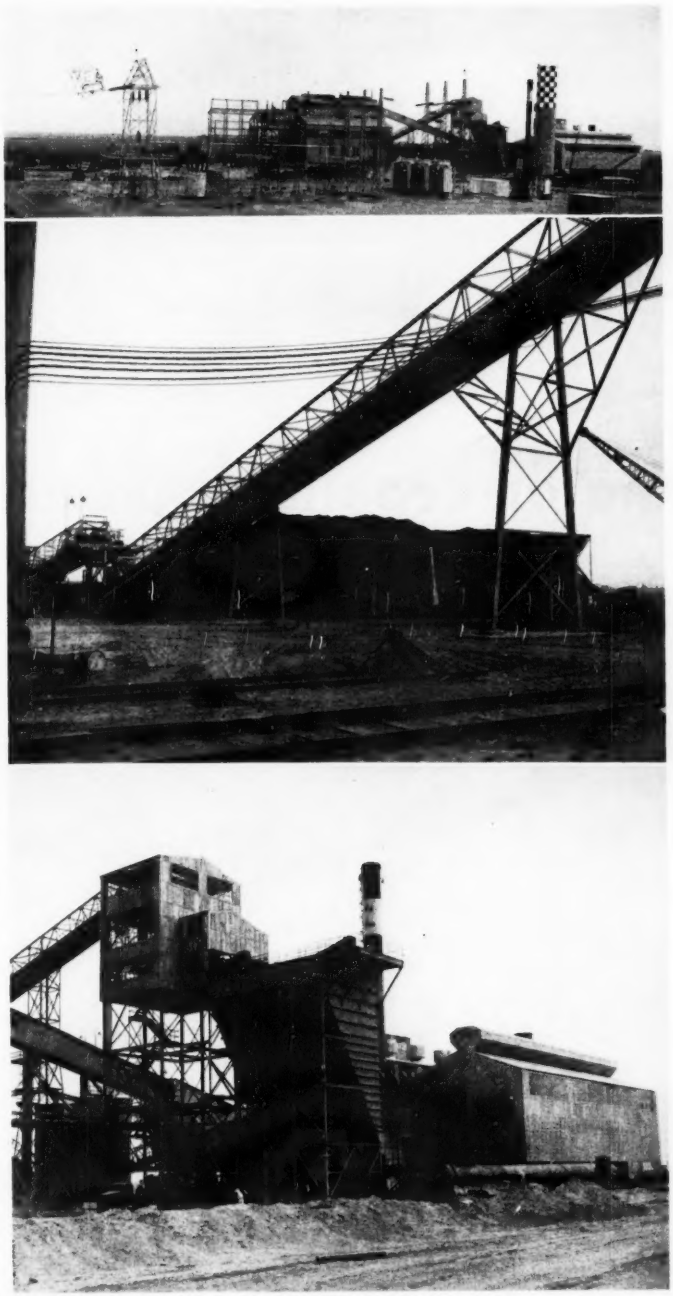
One of the features of the furnace is that air must be excluded. A furnace of this description, if properly constructed and operated, can be run continuously for long periods. Barring accidents, an annual overhaul keeps the furnace in good condition. Power consumed by the furnace, as mentioned, is 17,500 kw.

Power Supply

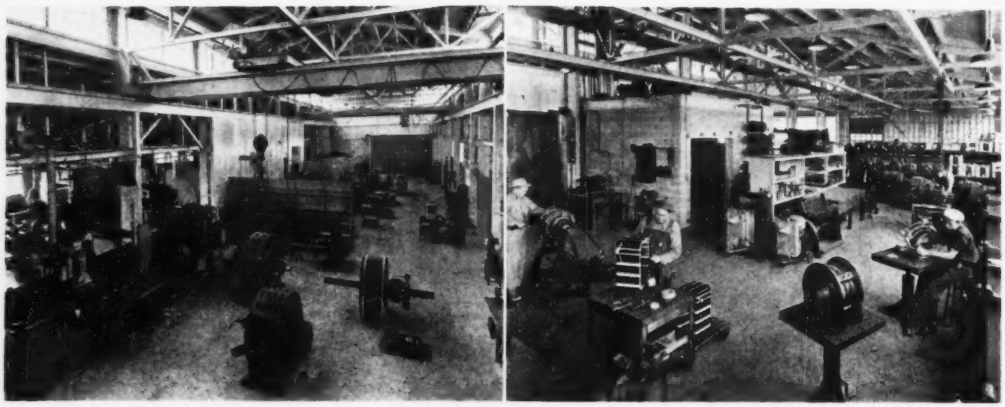
The Idaho Power Co. constructed a substation with a bank of 37,500-kva. transformers, 400 ft. from Westvaco's furnace. The bank has the largest single-phase transformers used by Idaho Power at any of its distribution substations. Transformers step down from 138,600 volts delta to 13,200 volts wye. Low-voltage switchgear is of the metal-clad type.

Provision for forced-oil, forced-air cooling of the transformers will provide a bank rating of 64,875 kva. This will serve as spare capacity for a second bank of transformers if installed at a later date. The substation is set up for supervisory control from the American Falls power plant 20 miles away.

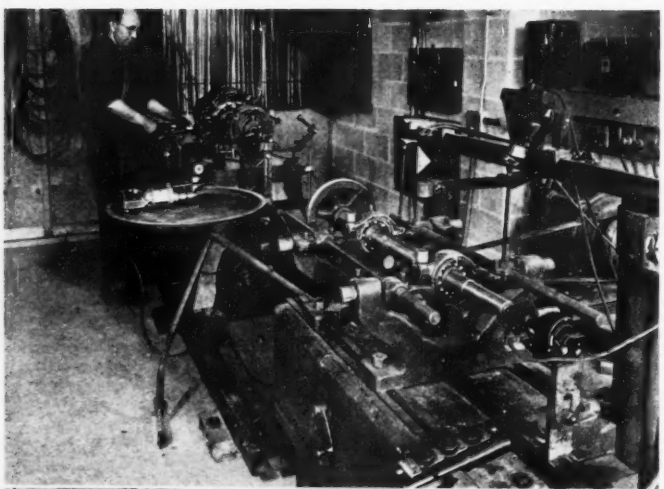
An official of Westvaco recently made the following statement at a meeting at Sun Valley, Idaho: "We have received the finest kind of support and I want to mention especially such organizations as the Idaho Power Co., the Union Pacific Railroad and the J. R. Simplot Co., all of whom have contributed in a very large way to the successful development of the Pocatello phosphate project, both before and after Westvaco came into the picture. These companies, and the men of vision who operate them, deserve a great deal of credit for their intelligent and intensive efforts on behalf of the state of Idaho and its people."

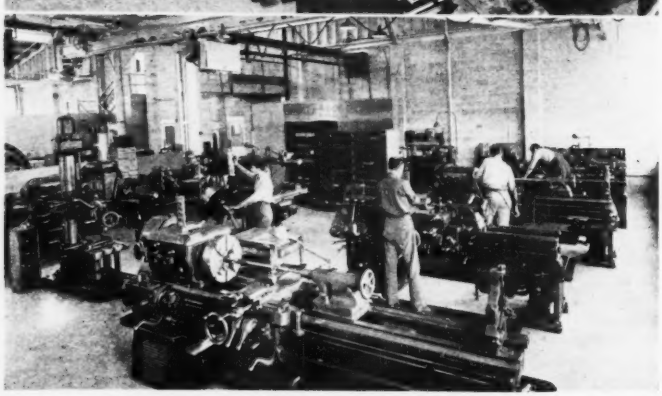


Idaho Power company's new 37,500-kva. substation is seen in foreground of upper view. Conveyor system (center) is used both in unloading railroad cars and in taking shale from the phosphate stockpile to the electric furnace. Below is shown part of conveyor system, the kiln where raw phosphate shale is calcined, and cooler building (at extreme right). Ample privately produced electric power was available to attract this important new industry to the state of Idaho



Motor Repair Shop Serves Industry





ELECTRIFIED industry could not function efficiently without its concomitant, the modern electric motor repair shop. One of the most modern and well-equipped electric motor shops to serve industry is that of the Pacific Electric Motor Co. in Oakland. This 42-year-old concern recently moved into its new quarter million dollar facilities at 1009 66th Ave. in East Oakland. Those in a position to judge say that it is the finest equipped individually owned shop in the country. The plant building occupies a two-acre plot with plenty of room for off-street parking and future expansion. It is close to the new Oakland freeway, the better to serve customers east and north in the far-flung East Bay industrial district. A year and a half went into its design. Every man in the organiza-

Main bay (top left) has two cranes and plenty of headroom for handling large equipment. Upper right is view of motor winding shop with crane and all necessary facilities for handling motor rewinds. Work flows smoothly on a coordinated production line

Two dynamic balancing machines shown in center photograph are used for speedy and accurate balancing of rotating parts. Few motor shops have such specialized equipment available

Spacious and completely equipped machine shop is shown below with its four lathes, milling machine, shaper, drill press and the overhead crane

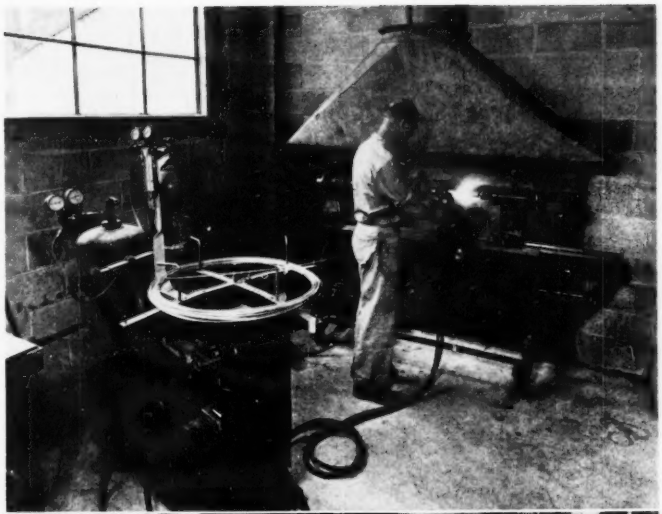
tion had a part in the planning. The result incorporates 42 years of experience in this type of business.

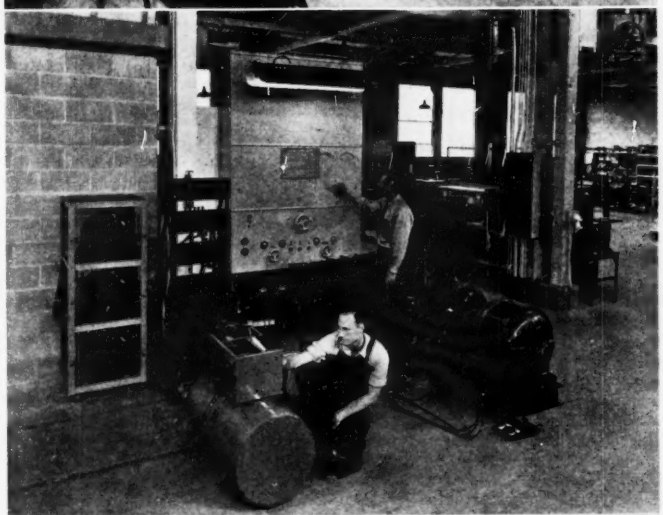
Shop area in the 120x200-ft. building comprises 14,000 sq. ft. Facilities for handling motor repairs consist of a steam cleaning booth, coil forming and winding department, bake ovens, machine shop, dynamic balancing equipment, metal spray equipment for worn shafts, and a very complete test department. Besides these facilities there is a large stock room carrying renewal parts for all standard motors; wiring materials and devices, and a large stock of new motors and controls. The shop has three bays. Each side bay has an electric crane and the center bay has two cranes. An automatically operated door at the end of the central high bay permits trucks to drive into the building for access to the cranes. Two, two-ton trucks with hydraulic lift tail gates are used for loading large motors, heavy equipment, cable reels, tool boxes, etc.

The company also does an industrial electrical contracting business and for this adequate and convenient facilities have been provided. For this phase of the concern's business, a staff of power and illuminating engineers is maintained. Pacific Electric Motor operates on a philosophy of selling its clients an engineering service, rather than simply bidding on plans and specifications. Under this policy the company does a large volume of industrial plant electrical modernization work.

An area of 6,000 sq. ft. is utilized for offices. Office space is heated with underfloor hot water pipes, and is well lighted. Three types of lighting are used; incandescent, regular and slimline fluorescent. Each type is used where it is functionally suited. The lighting system is also used to demonstrate engineered lighting to customers. Above the offices there are 4,000 sq. ft. of storage for slow-moving stock, files, and lunch room and washrooms. Any part of this space is available for future expansion.

With such modern and complete facilities to serve industry, President Frank E Boyd has every reason to be proud of his new plant.





Metal spraying equipment (upper) for building up worn shafts is an addition to usual motor shop facilities. Testing equipment at center includes facilities for covering all operating voltages up to 2,400 volts with 300-kva. capacity. Stockroom (lower) where renewal parts and stock for all standard motors are carried, as well as wiring materials and new motors

Electrical West—Vol. 103, No. 4

Social and Economic Responsibilities of the Engineer

W. C. Mullendore*
President, Southern California Edison Co.

MY text for this discussion of the social and economic responsibilities of the engineer is taken from a book by the man whom I consider to be the greatest philosopher of this century. He is Jose Ortega y Gasset, the author of *Revolt of the Masses.* The book to which I refer is *Toward a Philosophy of History*, written by him in 1940. Here is the passage from Ortega's book, which I propose shall serve both as a text and an introduction to my subject:

Ortega says:

"My book, *The Revolt of the Masses*, was written under the haunting impression—in 1928, be it noted, at the climax of prosperity—that this magnificent and miraculous technology of ours was endangered and might crumble between our fingers and vanish faster than anybody imagined. Today I am more than ever frightened. I wish it would dawn upon engineers that, in order to be an engineer, it is not enough to be an engineer. While they are minding their own business, history may be pulling away the ground from under their feet.

"Alertness is what we require. We are not allowed to confine ourselves within our own professions, but must live in full view of the entire scene of life, which is always total. The supreme art of living is a consummation gained by no single calling and no single science; it is the yield of all occupations and all sciences, and many things besides. . . . . Human life and everything in it is a constant and absolute risk. The deadly blow may come from where it is least expected. A whole culture may run dry through an imperceptible leak. . . . This much is clear: The social, economic and political conditions under which he (the engineer) works are changing rapidly. . . . .

"People believe modern technology more firmly established in history than all previous technologies because of its scientific foundations. But this alleged security is illusory. . . .

"Indeed, it is just this feeling of security which is endangering Western civilization. The belief in progress, the conviction that on this level of history a major setback can no longer happen and the world will mechanically go the full length of prosperity, has loosened the rivets of human caution and flung open the gates for a new invasion of barbarism."

Now, I have quoted thus at length from Ortega because he has summarized better than could I, and certainly with more authority, exactly the message that I wanted to bring to you.

I am an alarmist—an unashamed and unapologetic alarmist. Ortega said he was frightened in 1929 and more so in 1940. I began to be alarmed by the threat of Socialism in the United States some 18 years ago and my alarm has increased year by year as collectivist policies have grown into the Welfare State. My deep concern has been aggravated by an apparent lack of awareness, if not indifference, on the part of political, business and other leadership in the face of what has seemed to me to be a growing disintegration of the foundations of our achievement and progress. It has seemed that too often, the specialist—the scientist, the engineer, the business manager, the politician, the labor leader, the doctor, the educator—in this period of upheaval, of confusion, disorder and bewilderment, has wanted to avoid looking at and trying to understand what was occurring in the broader fields of human life on this planet. While joining in a chorus of reassuring platitudes as to the inevitability of progress, too many of these leaders have immersed themselves more and more in their specialty. Others have frankly avoided the unpleasant facts, arguing that there was nothing they could do about the situation anyway, so why be disturbed? The result has been to leave the field of public discussion to the domination of the demagogues who achieve the power which they seek in the confusion which they create, and to the optimist who allays the discomfort caused by the disagreeable aspects in the future outlook by emphasizing only the more favorable and promising.

Man in the Twentieth Century has become so intrigued by and so dependent upon technology that he seems to have forgotten that discoveries and inventions in the fields of science, mechanical and electrical energy in their manifold applications—all these wonderful gadgets and devices thus made available—are after all not an end in themselves, but merely tools to be used by man in the improvement and development of his life on this earth. Further, these wonderful discoveries have not repealed a single one of the Ten Commandments nor a single one of the basic laws of human nature or the laws governing and controlling the growth and development of the spiritual life of the human being. True, the vast stores of energy that are now at his command to supplement his own energy have freed man from much drudgery and multiplied many fold his power to produce goods and services; but the development of the individual man still is dependent upon his freedom to develop his own innate ability, and that development remains roughly proportionate to the effort exerted by the individual in drawing out and refining those latent and innate abilities. Order and organization are more than ever necessary in a specialized and industrial society, and the preservation of individual freedom remains proportionate to the self-reliance and the maintenance of the dignity and self-respect of the individual.

Let me get away from these abstractions and generalities and say what I am trying to say bluntly and more plainly. It is this: A nation, a society or a civilization can and will crack up and disintegrate despite the finest technology, and productive machinery of the highest potentiality, if such society, nation or civilization defies, ignores and violates the laws of God governing human conduct on this earth. The latest developments in science, possession of the highest of technical skills will not protect us against the destructive powers of human greed, envy and hatred aroused, mobilized and directed by demagogic leaders who, for the sake of power "loosen the rivets of human caution and fling open the gates for a new invasion of barbarism." Some of our new neighbors and dependents among the nations of the world can offer eloquent testimony to the truth of these statements.

For the sake of emphasis (since this is our main theme) let me repeat the

* From an address before the Pacific General Meeting, American Institute of Electrical Engineers, San Francisco Aug. 23, 1949.

thought in different words: It matters not how brilliant or accomplished our scientists and engineers are; it matters not how much we know about chemistry, physics and atomic fission, how many labor-saving devices and intriguing gadgets for intercommunication we could make available; nor does it matter how productive we could be if we obeyed the laws of God instead of the dictates of the devil. If the human beings for the service of whom all these wonderful things are intended, insist on fighting and cheating, and robbing their fellowman of his earnings, and in general raising hell by following false leaders who appeal to their greed and to their baser emotions as a means of gaining power over them, then our culture and our civilization will be destroyed. And all of this supports the conclusion that it is even more important to preserve and to improve human relations and the structure of human society than it is to make further progress in atomic research or television or to discover some new law of thermodynamics. All of these advancements in knowledge are of no avail if the human beings in whose behalf the knowledge is sought insist on reverting to barbarism and destroying the possibilities of living peacefully together.

Why the Engineer?

But our subject is the economic and social responsibility of the engineer. Why single out the engineer? Has he any special or particular responsibility in this moment of history? I believe that a good case can be made out for the proposition that he has such a special responsibility. Why? First, because the engineer has contributed much to the heavy reliance upon technology and the practical applications of scientific advance as the solution to all our problems, social and economic. Second, the engineer and his associates in the field of technology have made available to mankind in general and to the demagogues in particular means of transportation and communication which have brought the whole of mankind into closer proximity, and have made it possible for the demagogue and rabble rouser, the marauder and the wrecker, to reach those mass populations to the growth of which still other scientific and engineering achievements have contributed.

But whether the engineer has a special responsibility over and beyond his fellows who are leaders in other fields is relatively unimportant and we need not stop to argue the point here. Certainly it will be admitted that our responsibility to mankind in general and to our own family, community and nation, in a time of peril such as war or other devastating calamity, is commensurate with our ability. In time of war, when there is general and widespread recognition of the threat to our freedom and even to our survival, we do not have to be told and we do not question that our first duty is to do all that we can to help defend our country, and unless the pursuance of our special pursuits are held to be the best way we can make our contribution to the common effort, that pursuit will be held secondary or abandoned until the war is over.

Our Civilization Challenged

Well, here we are in the year 1949, in the beginning of the fifth year after V-J Day, in a very sick world. Our civilization and our culture are challenged and under attack both from without and within by a destructive power now holding sway over a large part of Europe and Asia. This malevolent power has its infiltrating agents and saboteurs and their fellow travelers and dupes at work day and night in every country of the world, including our own. In our struggle to defend ourselves and our culture and institutions against the open and hidden threats of that power, we have assumed immeasurable burdens not only for maintaining our own national defense, but the economic and rehabilitation burdens of impoverished foreign nations having a total population at least twice that of our own.

Already in fighting wars against enemies which we believed menaced our civilization, we have sacrificed hundreds of thousands of lives and incurred obligations against our future earnings equal to the savings which we have accumulated throughout our history as an independent nation. Nor is that by any means all. Before, during and since our involvement in World War II, the same destructive foreign ideologies of collectivism and totalitarianism that have enslaved Russia, destroyed Europe and have now engulfed Great Britain, have been flowing in upon us and making distinct headway in destroying and supplanting those distinctive American institutions of freedom that were and are the source and secret of our strength. Over the past sixteen years in particular, we have been increasingly abandoning the new, modern, liberal American system of limited federal, republican government, and substituting therefor the reactionary old-world plan of a centralized paternalistic government with its creeping paralysis of individual initiative and self-reliance which are the indispensable components of freedom.

The "processes of democracy" have been used to induce large and diverse groups of our people to surrender to the central government, i.e., to the Congress and to the President and his bureaucracy, those powers reserved to them by the Constitution of the United States, in exchange for subsidies, special favors or handouts taken from the people and redistributed at high cost to them by and through an ever-growing federal bureaucracy.

The minority groups receiving handouts now form a majority and those supplying most of the wealth are the exploited minority. That is to say, through these many devices for collection and redistribution of wealth, agents and agencies of the federal government have as their clients or dependents the majority of the voting population of the United States. Thus self-reliance and initiative of our people have been undermined. No people ever have or ever will preserve their individual liberty once they have lost their self-reliance and become dependent upon government for their economic planning, direction and welfare.

Day of the Demagogue

This is the day and the age of the demagogue. Throughout history the demagogue has been a menace. He is the arsonist, the saboteur, the dynamiter, in the field of human relations. Unrestrained by a proper regard for the basic moral laws and principles which hold society together and make progress possible by restraining the destructive passions of men, the demagogue deliberately and recklessly arouses and inflames the emotions of human beings in order to create a wave on which he may ride into the position of power which he seeks.

With the explosive advance in the technique of communication and transportation in the Twentieth Century, the demagogue was quick to recognize the unique opportunity afforded him thus to reach and to arouse great masses of people. In the world generally, the demagogue brought on war and revolutions. In the United States of America, he took advantage of the waves of emotion and the fundamental disturbances created by war and violence, and he capitalized particularly upon the economic conditions resulting from world-wide wars and revolutions. Gradually at first, but finally with great speed, power was surrendered by the people in the U.S.A., as elsewhere throughout the world, to a central government under the persuasion of clever demagogues, and

through the manipulation of skilled but perverted assistants drawn from the so-called intellectual world.

You ask: Well, just what does this have to do with the subject "the social and economic responsibility of the engineer"? What are we to do about all this disintegration of our culture? The answer that I would give has already been indicated. We are in the midst of a crisis. We are perilously near to the "point of no return." Obviously the great majority of our people are quite unaware of their peril, and for that reason one duty above all others rests upon each of us who sees and knows of the near approach of disaster. That duty is to do our utmost to awaken our fellow citizens, to arouse them from their lethargy, from their indulgence in the very practices and support of the very policies which are destroying them. It is as if we were again living on the frontier and as scouts had discovered the approach of a band of Indians intent upon massacring our neighbors. In this situation, men of trained minds must become scouts charged with the duty of arousing and alarming the unaware. As Ortega said: "Alertness is what we require. We are not allowed 'in this time of peril' to confine ourselves within our own professions."

"But," someone says, "just what is it that you propose we should do? After all, we are engineers. We have work to do which is essential both to the maintenance and progress of great industries. Our work necessarily requires specialization and concentration and we are here at this convention to consider together some of the problems bearing directly upon the responsibilities with which we are charged. What would you have us do? Drop everything and devote ourselves to the political, economic and social worries you are so excited about? And supposing we did, what could we do except to add to the confusion?"

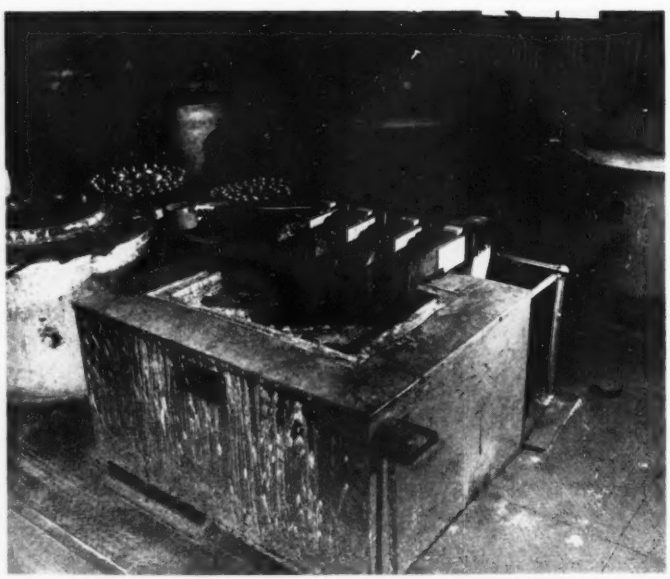
Well, by way of summary and in conclusion, let me try to answer those perfectly proper questions: First of all, I am not proposing that we should all take a leave of absence from our jobs and take to the hustings for the purpose of sounding the alarm about the imminent danger to our basic institutions. Of course we have important work to do and we must keep at it. I am saying, however, that regardless of our devotion to the means by which we earn our livelihood, we also have a paramount responsibility to ourselves and our children to preserve the foundations and the framework of this house within which we live. Along with our responsibility for our daily work, we have an even higher or primary responsibility of doing what we reasonably can to ward off and defeat the forces that are now forging chains of governmental power and authority which will restrict and regiment the lives of our children to the point of enslavement.

In the face of such fundamental issues affecting the whole future of our civilization as those which confront us today, silence and inactivity on our part indicates indifference, and the indifferent or complacent are dangerous allies of our enemies, whether or not they know it or mean to be such. Those who help to conceal danger, or distract attention from danger, help to lull the people generally into a false sense of security. Those who go further and give positive assurance that all is well so far as our free institutions and our individual freedom are concerned, do still more harm. And most destructive of all, of course, are those who lend their aid and support to the programs that are a part of the great socialistic advance of the present day.

No, I do not apologize for bringing this most important aspect of your social and political and economic responsibility before you. Neither am I concerned lest some may feel that this smacks of partisan politics. On that score, unfortunately, I could not be partisan because both great political parties in the United States today, like those in England, are largely committed to the continuance of the Socialist program. But I am concerned lest it be said of us by our children that, when their heritage was being destroyed, their fathers, notwithstanding their education and opportunity to know the facts, were so busy with their electrons and formulas, with their great engineering projects and the perfection of television and other gadgets, that they had no time to help sound the alarm or to otherwise lend a hand in the preservation of the fundamental liberties without which the whole of that heritage will be lost.

Salt Bath Annealing Furnace

Greater capacity with the same floor space and ability to turn out more work than from a resistance-type furnace are principal advantages of the electrode-type salt bath annealing furnace shown. This 100-kw., low-voltage pot is the latest of several electric heat-treating furnaces used by the Security Engineering Co. of Whittier, Calif. in the manufacture of oil well tools. The furnace uses four electrodes immersed in a salt bath as contrasted with the more conventional resistance-type heat-treating furnace. Other advantages are: can be operated at higher temperatures than resistance pots; electrodynamic stirring action of the salt bath; pot may be shut down and the salt bath frozen, then reheated without damage to the pot; low maintenance as compared to resistance pots; electrodes may be changed while pot is in service; and lower initial cost.



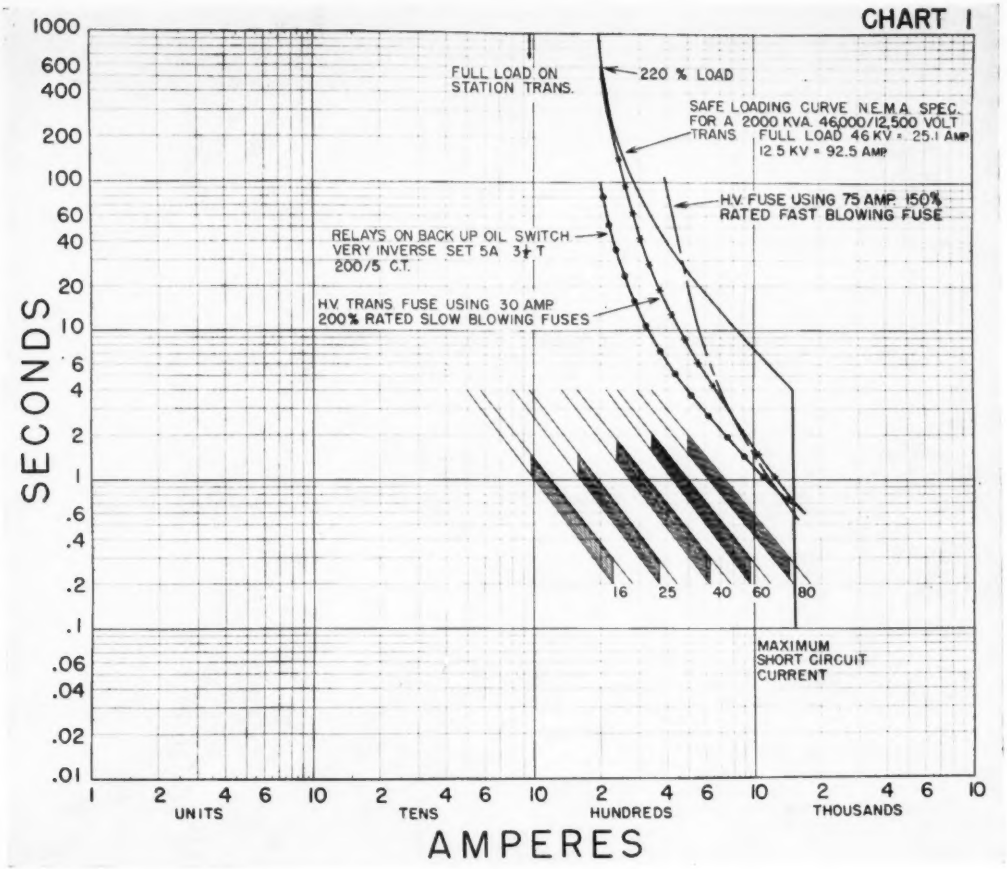


CHART 1
FULL LOAD ON STATION TRANS.
220 % LOAD
SAFE LOADING CURVE N.E.M.A. SPEC. FOR A 2000 KVA. 46,000/12,500 VOLT TRANS FULL LOAD 46 KV = 25.1 AMP 12.5 KV = 92.5 AMP
H.V. FUSE USING 75 AMP. 150% RATED FAST BLOWING FUSE
RELAYS ON BACK UP OIL SWITCH VERY INVERSE SET 5A 3 T 200/5 C.T.
H.V. TRANS. FUSE USING 30 AMP. 200% RATED SLOW BLOWING FUSES
16 25 40 60 80
MAXIMUM SHORT CIRCUIT CURRENT
SECONDS
1000 600 400 200 100 60 40 20 10 6 4 2 1 .6 .4 .2 .1 .06 .04 .02 .01
1 2 4 6 10 2 4 6 10 2 4 6 10 2 4 6 10
UNITS TENS HUNDREDS THOUSANDS
AMPERES

Fuse Coordination In Practice

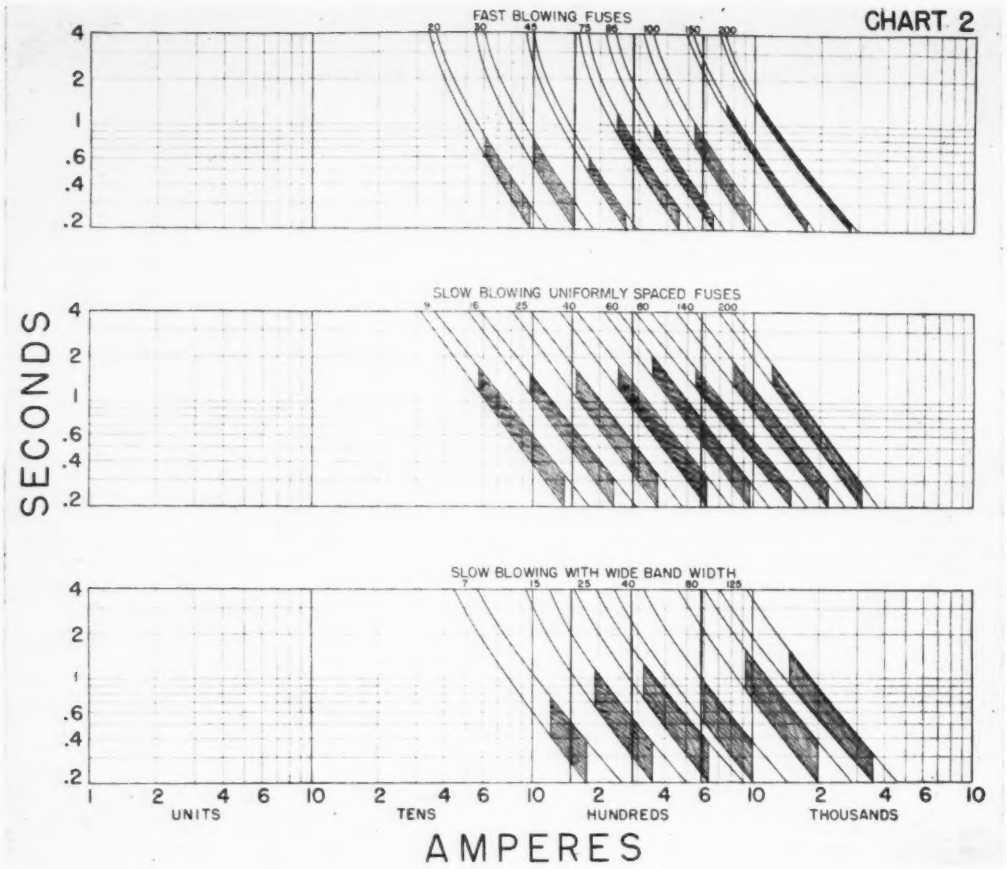
H. E. Waterman
Idaho Power Co., Boise

SINCE co-ordinating fuses were first applied to rural lines to isolate faulted sections of lines, some twelve years have elapsed. During this time fuses with widely differing blowing characteristics have been developed. In many instances changes in feeder conductors, line routings, substation transformer sizes, generating station capacities etc., have been made which may make it necessary to change some co-ordinating fuse sizes and in some instances the fuse locations on the lines. When this is done, it might be well to examine the blowing characteristics of the fuses now available to see if a change in the type of fuses used will give better operating results.

Several charts have been prepared to indicate how the differences in fuse characteristics affect the problem of applying co-ordinating fuses.

Chart 1 shows time-current curves for a 2,000 kva. substation, using high-voltage fuses for transformer protection, back up relays for feeder protection and co-ordinating fuses on the feeders. In applying high-voltage fuses to protect the substation transformer it is desirable to select a fuse that will closely parallel the safe loading curve of the transformer, particularly at the lower end of the curve. Two high-voltage fuse curves are shown. Neither of them parallels the transformer curve, but it will be noted that the slow blowing fuse curve shown comes much closer than the fast blowing curve, and that it provides much better protection to the transformers, crossing the safe loading curve at around 220% load on the transformer. The fast blowing fuse crosses at 550% load.

The back up relays should protect the high-voltage transformer fuses and provide means of tripping the feeder switch should a fuse fail or a fault develop between the feeder switch and the first fuse in the line. They should



allow time for the closest line fuses to blow before closing their contacts. The ideal relay curve would parallel the high-voltage fuse curve and fall slightly lower on the chart. While the relay curve shown does not parallel the fuse curve, it does protect the high-voltage fuse for all except extremely high currents. The feeder fuse curves fall below the relay curve with a slope through the 4-second and .2-second range approximately the same as the relay curve. The closer the high-voltage fuse relay and feeder fuse curves can be brought in toward the transformer safe loading curve and still have sufficient time spacing between them to co-ordinate properly, the more fuse sizes can be applied to the lines.

Chart 2 shows total clearing and minimum melting time curves between the .2-second and 4-second time range, for three different types of fuses. (This time range has been found to be very satisfactory for blowing co-ordinating fuses on feeders). The shaded portions of the curves indicate the limits between which the fuses should operate when they are installed in series on a feeder line.

It will be noted that the more curvature there is between the time limits established and the wider the band width between the total clearing and minimum melting curves, the shorter the working range is. A long working range is desirable because it gives more latitude in selecting the location of the fuses and permits a larger number of fuse sizes to be used on the feeder. A study of the curves on this chart makes these facts apparent.

Chart 3 shows a work sheet for use in determining the location of fuses and their sizes. It also provides a good record to keep on file. It is similar to Chart 2 except that only the curves for the fuses used are shown. Instead of plotting time against current, time is plotted against line impedence and a space is provided under the curves to draw a single-line drawing of the line. The substation and various line taps and fuses are shown under the proper point on the impedence scale. By extending a line vertically to intersect the fuse curve above it, the fuse sizes that would be suitable at that location are indicated. Usually the larger fuse will be applied if two sizes are intersected. If the point of intersection is too near the end of the shaded portion of the curve the next smaller fuse may be preferable.

Chart 4 shows safe loading curves for 3- 5- and 15-kva. 7,200-volt distribution transformers with curves for several different types of fuses for protecting the transformers. Some companies have used no fuses smaller than 5 amp. on distribution transformers. On small-size 7,200-volt transformers, service wire shorts and overloads could not be cleared by 5-amp. fuses. With the advent of the slow and very slow fuse it is now possible to provide almost any degree of protection desired for small distribution transformers with little or no reduction in the surge capacity of the fuse.

CHART 3

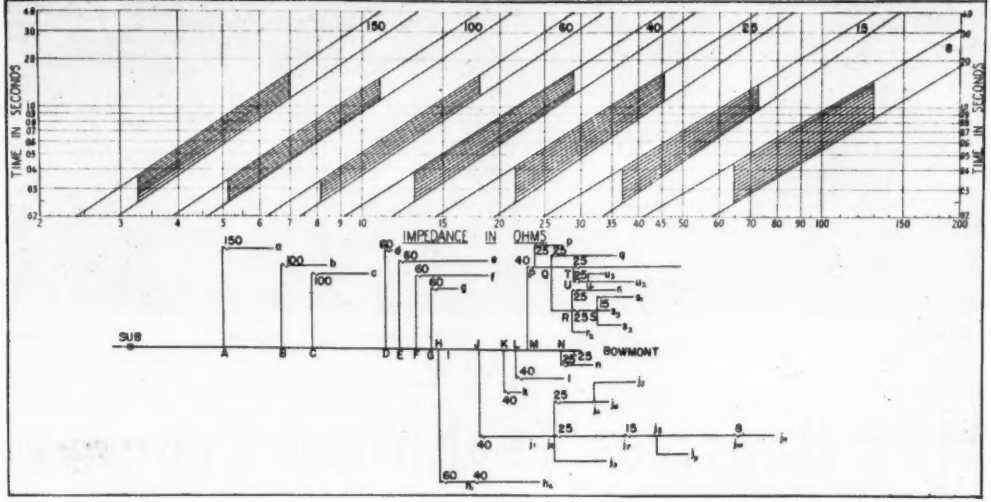
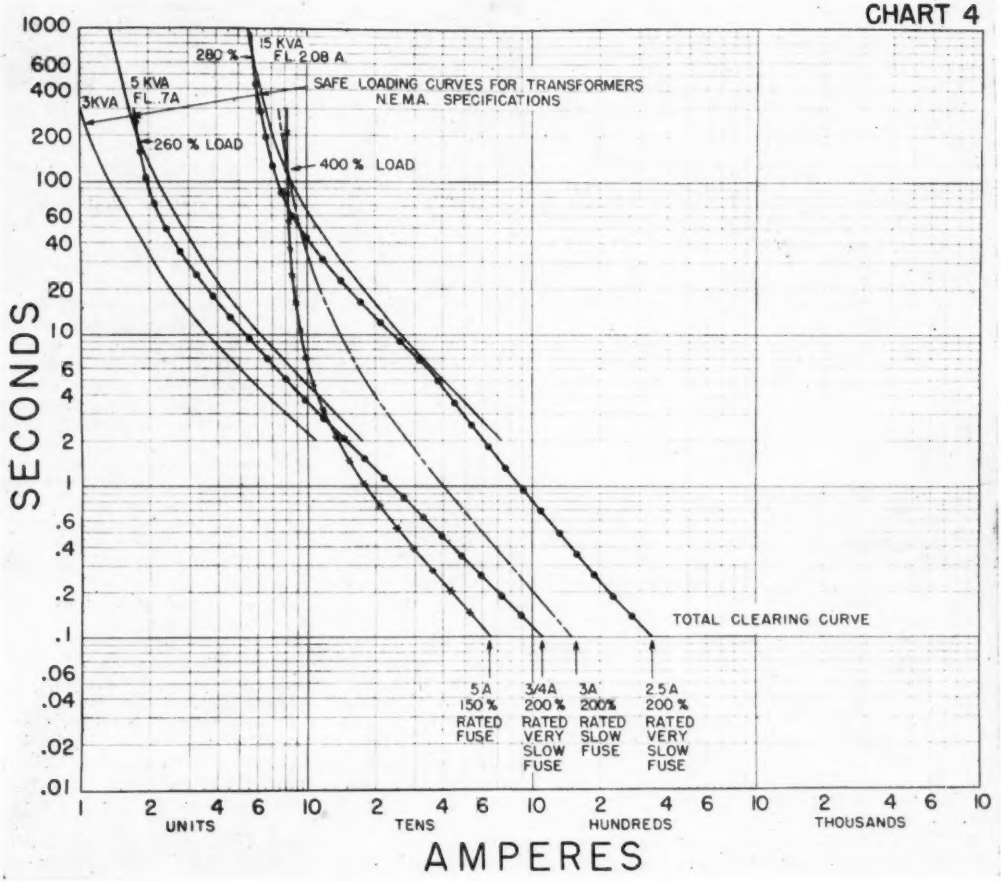
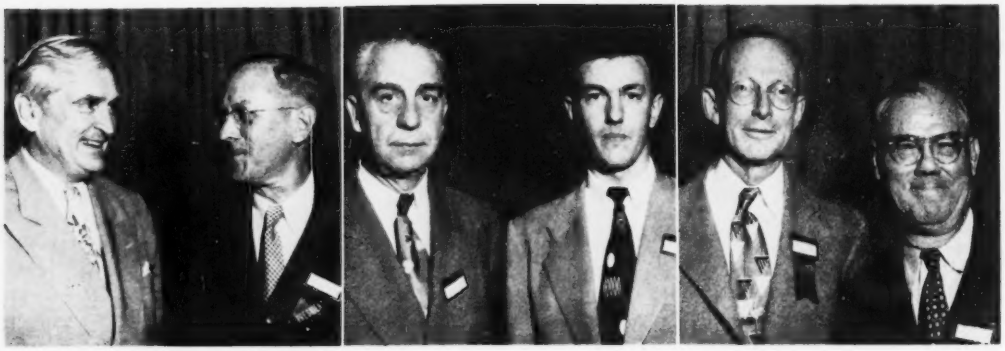


CHART 4





Mullendore Fairman Bishop Gordon Hopkins Hinson

AIEE Hears of Technical Progress

THE engineer must be more than an engineer in the world of today because the world needs his trained mind and analytical ability in the field of human relations, W. C. Mullendore, president, Southern California Edison Co., told those attending the opening session of the Pacific General Meeting of the American Institute of Electrical Engineers, held in San Francisco, Aug. 23-26. No specialist should confine himself to his specialty in a time when the whole advance of civilization is threatened, said Mullendore. In this situation we need as never before all the trained minds and skilled analysts who can contribute to the preservation and restoration of the sanity of mankind and the principles without which our civilization will certainly disappear. This is the responsibility of the engineer, declared Mullendore. Complete text of his address is published elsewhere in this issue.

National Institute President James F. Fairman in a luncheon address posed the question, "Can engineers be synchronized?" "Can engineers be persuaded to pull together, to cooperate, to pool their talents and resources in an orderly, organized effort to attain common objectives outside their several fields of specialized technology?" asked Fairman. "Many of us believe they can be so persuaded. And because we believe, we persist in our endeavor to find the right formula and to supply the requisite leadership. In spite of apparent diversity of opinion among members of the Institute, my answer is still yes; but it will be a gradual process. Your board of directors has appointed Titus G. LeClair to represent the Institute at a unity committee meeting of 15 of the larger engineering societies to be held in October. This is another step on the road to a better understanding among engineering societies and we hope will lead to greater unity of the engineering profession."

Electrical power facilities in California must be trebled in the next 20 years, said Robert P. O'Brien, California Public Utilities Commission. Based on a study of past load growth and his estimate of future trends, he foresees energy requirements of 53 to 90 billion kwh. by 1970. Postwar plans of PG and E to meet these increasing loads were told by W. R. Johnson of that company. Included in the 1946-51 construction program are 1.3 million kw. of new steam and hydro generation, more than 1,400 miles of 230-kv. transmission and 600 miles of 115-kv. circuit.

The new Swedish 380-kv. system now under construction was described by A. Rusck and B. Rathsman of the Swedish State Power Board. The 380-kv. line, 593 miles long, will employ double conductors per phase, spaced $17\frac{3}{4}$ in. The double conductor arrangement reduces reactance by 26%, improves stability and raises critical corona voltage so that solid steel-aluminum cables of moderate size may be used. Breakers are of the air-blast type with interrupting capacity of eight million kva. To increase transmission capacity a series capacitor is being installed in an exsting 220-kv. line, and double conductors are being used on two new 220-kv. lines nearing completion.

American and foreign practice in high-voltage transmission was compared by Lloyd F. Hunt, Southern California Edison, with slides and comment. He discussed the Swedish 380-kv. and the French 400-kv. systems, pointing out that foreign practice is ahead of that in this country in many respects. In answer to the question, "When should generator windings be replaced?" E. A. Crellin, PG and E, said that the final determination must rest upon the operating record of the unit and the best judgment of the man most familiar with its history and probable future behavior. A very conservative policy is to let sleeping dogs lie, said he. Recent developments in high-speed-reclosing impulse circuit breakers have effected such drastic reduction in reclosing time that it now appears the time required to deionize the fault arc will be the limiting factor in high-speed reclosing on transmission lines rather than the breaker reclosing time, said A. C. Boisseau, B. W. Wyman and W. F. Skeats, General Electric Co. E. J. Harrington, Bonneville Power Administration, and E. C. Starr, Oregon State College, reported a method of determining fault-arc deionization time and cited 115-kv. tests indicating that large magnitude faults cleared in 4.5 cycles might require as much as 12.5 to 14.5 cycles of dead time for path deionization, thereby permitting reclosure 17 to 19 cycles after inception of the fault. Further progress in locating transmission faults by the echo-ranging means was given in a paper by L. R. Spaulding and C. C. Diemond, BPA. A type-C fault locator installation which fulfills several ad-

Tenny McFarland Peterson Wright Houston Daniels

ditional requirements of an ideal fault locator was described.

Power Generation and Distribution

Two sessions were devoted to power generation and distribution. Centralized automatic control of PG and E's new 200,000-kw. station P steam plant was described by F. S. Benson to show modern trend in steam plant design to reduce operating labor. Network analyzer studies were presented by B. V. Hoard and Lewis Weiner, BPA, showing a net over-all saving to the government of $7 million through use of low-reactance, as compared with high-reactance, generators and transformers at the 1,128 mw. McNary plant on the Columbia. As a result, transient generator reactance not greater than 32% and transformer reactance not more than 8% will be used. Higher reactance apparatus would have necessitated a fourth 230-kv. transmission line at a cost of $10,260,000. Increased cost of low-reactance equipment amounted to only $3,170,000, making the net saving $7,090,000.

Construction features resulting in the very low cost of $21,000 per mile for a 202-mile, 230-kv. steel tower line were described by E. M. Wright, PG and E. Principal factors were: use of long crossarms permitting greater swing of the insulators made possible the elimination of dead-end structures without weakening the line; raising span limit and keeping tension low saved about 30% on steel besides reducing number of foundations and insulators; unit type of tower extension reduced cost through quantity purchase; foundation design permitted use of hole boring machines; substantial labor savings through use of mobile two-way FM radio in stringing and sagging-in conductor.

A magnetic oscillograph that measures and records mechanical movement, hydraulic pressures, bearing loads, and turbine-vibration and noise on hydraulic units was described by L. R. Engvall, Department of Interior. The device has been used at Grand Coulee to obtain very valuable information. Its simplicity and versatility suggest many other applications, important among which are those for routine maintenance work.

Need for an interrupting device for switching, both automatic and manual, for which conventional oil circuit breakers cannot be justified economically, and for which fuses are undesirable, was outlined by O. A. Demuth and H. L. Rorden, BPA. In an attempt to obtain a low-cost switch, the Bonneville Power Administration invited manufacturers to supply load interrupter switches and cooperate in staged tests. The request specified a 115-kv. switch capable of interrupting 120 mva. and having a continuous rating of 200 amp. Three manufacturers responded, Schwager-Wood Corp., Electrical Engineers Equipment Co. and Pacific Electric Mfg. Co. Results of tests were highly satisfactory and showed that load interrupter switches can be designed to give satisfactory operation considerably in excess of the 120-mva. test requirement, and at a cost that permits their consideration for small loads. Tentative plans are now being formulated for extending similar tests to 230 kv.

Companion papers by members of the three manufacturers gave details of test switch construction and test performance. A. C. Schwager reported for his company, P. B. Hoyle for Three E, and R. F. Gibbons for PEM. Interrupting capacity of all switches far in excess of the required 120 mva. were reported. One switch successfully interrupted nearly 4,000 amp., or about ¾ million kva., three-phase equivalent. Line-charging current of 44 amp., approximating sectionalizing of 115-kv. lines of more than 100 miles, also was successfully interrupted by the switches. Two of the manufacturers, Schwager-Wood and Three E, now have production models of 115-kv. load interrupter switches on the market as a result of the tests. Pacific Electric Mfg. Co. has developments under way.

Low-Loss Clamps—Vibration

Heating of transmission line suspension clamps due to hysteresis and eddy current losses was shown to be 20 times greater for all-ferrous clamps as compared with non-magnetic body, in a paper by V. L. Crabb and J. M. Sheadel, Ohio Brass Co. A method for determining power loss, formulae and data were presented in the paper. E. M. Wright, PG and E, pointed out that low-loss suspension clamps are most important on large-conductor high-voltage lines. He said aluminum dead-end clamps are available for small conductor (397,000 cir. mil) but not for larger conductors as yet.

The whole problem of protection of conductors at points of suspension was reviewed and progress reported in a paper by T. F. Peterson and J. C. Little, American Steel & Wire Co. Use of preformed armor rods for reinforcement, damping, splicing and repair was comprehensively covered. It is to be expected that, with the ever-expanding use and application of preformed armor rods, many phases of the general problem will be dealt with more completely. Walter Hayes, Aluminum Co. of America, said Alcoa has given permission to use preformed armor rods on ACSR conductor. He commented that Alcoa tests show discrepancies in many respects with Peterson's results, but went on to say that the two are working cooperatively on methods of testing, etc., in the interest of progress.

In a paper on Columbia Steel's new tin plate mill at Pittsburg, Calif., Geo. L. Beaver, G-E, emphasized the

Buese Cozzens Kanouse Bettannier Nelson Blakeslee

modern drives and automatic control features of steel mill applications that make possible present high production rates. T. A. Bettersworth, PG and E, in his paper on series capacitors showed that series capacitors on circuits of low X R ratio can effectively reduce voltage fluctuations caused by heavy starting currents and periodic heavy overloads on induction motors. They are not effective, however, he said, in reducing fluctuations caused by periodic loads that do not exceed rated load on such motors, because of the high power factor of such load increments.

In a report of dielectric strength of oil with variations in pressure and temperature, W. G. Hoover and W A. Hixon, Stanford University, found that an increase in pressure above atmospheric resulted in an increase in dielectric strength, but considerably less than directly proportional. Dielectric strength was also found to increase with rise in temperature when the oil was under pressures of 50 and 100 psi. Design features of Mission substation were dealt with in a paper by Einar Nilsson, PG and E. The 110-kv. gas-filled cable feed, ring bus, sound proofing and other features were described.

Communication strides since 1915 when transcontinental telephone service was established were detailed by D. I. Cone and C. V. Fowler, P. T. & T. Co. The latest facility to be added on the West Coast is a microwave radio relay link with several repeater stations between Los Angeles and San Francisco. When placed in service early next year the link will provide television channels and hundreds of message telephone circuits between the two cities. Broad-band coupling of power line carrier was proposed in a paper by R. H. Miller, PG and E. The author gave a suggested design for a band stopping filter which will attenuate a broad band of frequencies. Need for broad-band coupling exists due to increasing requirements for communication and the impracticability of coupling more than one or two channels of carrier to power lines by means of conventional equipment. Modern carrier current test equipment and its application was discussed by R. L. Brinton, PG and E. Two pieces of equipment developed by PG and E have proved invaluable. One is a carrier frequency oscillator having an output of 5 watts in the frequency range from 20 cycles of 200 kc.; the other a carrier frequency voltmeter of new design.

Home Heating Symposium

An entire session devoted to electric house heating brought forth a group of papers dealing with this live topic. The several means of utilizing electrical energy for space heating were analyzed by Stuart L. Forsyth, Westinghouse. He concluded that, everything considered, unit space heaters offer most advantages. G. E. Bishop, Coast Counties Gas & Electric Co., described the rather unique position of his company in deciding upon a space heating policy. Under present conditions a demand of approximately 5,000 kw. may be added to the January maximum demand on his system without exceeding that of the previous summer. This is because of a summer system peak due to irrigation pumping. Cost studies made on an incremental basis showed that space heating could be profitably served providing it did not increase system demand to a value greater than the highest demand of the preceding eleven months.

Factors affecting load characteristics were discussed by Buford H. Martin, TVA. Among the more important factors are installed capacity; type of construction and degree of insulation of houses; climatic conditions; type of heating system used; the use of load-regulating or limiting devices; and living habits of occupants of the home. Martin concluded that peak demand on feeders serving all-electric homes will occur in the morning; that demand appears to be directly related to minimum outdoor temperatures; and that use of load-regulating devices has a definite value in reducing peak demands and improving daily load factor.

J. C. Beckett, Wesix Electric Heater Co., described a load regulating device developed by his company. The regulator has three features, load limiting of total demand, automatic capacity control, and central control of unit heaters. All three of these factors influence characteristics of space-heating load. Beckett feels that some type of load regulating device will in the future be an important factor in the degree of acceptability of space-heating load by the utilities. Also that, by improving load characteristics of space heating, rates can be established that will permit growth of this type of load. A valuable resume of heat pump experience in the Portland area was presented by W. E. Gordon, Portland General Electric Co. "Application of the residential heat pump is in its infancy and in general is economically justified only on the basis of pride of ownership or necessity for summer cooling," said Gordon.

Besides the power engineers' sessions reported there were held five meetings devoted to air transportation and several student sessions. Under the general chairmanship of George C. Tenney, editor, ELECTRICAL WEST, convention committees had provided a number of well worthwhile inspection trips, and ample entertainment features for the ladies. Entertainment at the banquet was of unusually high caliber. Registration for the meeting reached a grand total of 840. This sets an all-time record for attendance at Pacific general meetings of the Institute. Next year's meeting is to be held at Pasadena in June in conjunction with the national Summer meet.

PREVENTIVE MAINTENANCE—II

H. Burns Colby

Maintenance Engineer
Public Service Co. of Colorado, Denver

PERIODIC testing is necessary if a high standard of insulation and operation is to be maintained, and breakdown by high voltage be forecast and prevented. Some of the more common types of electrical insulation and operation tests may be classified, as follows:

1. Destructive (primarily for factory use).
   a. 60-cycle high potential
   b. Kenotron (high voltage)
   c. Impulse
2. Non-destructive (maintenance tests).
   a. A-c dielectric loss, power factor, capacitance and a-c resistance.
   b. D-c insulation resistance and dielectric absorption (high-voltage megger or kenotron with voltmeter and milliameter).
   c. Contact resistance.
   d. Ground resistance.
   e. Mechanical operation of oil circuit breakers.
   f. Insulating oil (dielectric and acidity).
   g. Transformer ratio.

The effects of repeated destructive tests on insulation are cumulative and these tests are not normally used for field maintenance. The second group above is the type of tests usually made to assist in a preventive maintenance program. Some of the testing equipment and procedure will be outlined in the following.

Insulation is still the most vulnerable part of an electrical machine despite the fact that tremendous improvement has been made in insulating materials, in the technique of applying them and in their maintenance. Improvements in insulation have brought higher safe operating temperatures and an increase in life for some classes of insulating materials. However, developments in this connection have not kept pace with the developments applying to other parts of electrical machinery, such as the use of non-aging iron.

Insulation may be considered deteriorated when it has undergone a substantial change in its original electrical, mechanical, thermal and chemical characteristics. Of these characteristics, a loss of dielectric strength is usually considered the most important. Loss of dielectric strength may be detected by capacitance and power factor measurements and to some extent the d-c resistence test. Experience has shown that there is a reasonably good qualitative correlation between the high-voltage destructive tests and the a-c non-destructive tests for solid insulation. This deterioration of insulation is caused by the entrance of moisture or the formation of corona, or both. Since insulation is just a poor conductor, and of organic material, moisture affects the dielectric strength, the capacitance, dielectric absorption and conductivity. Ionization of organic insulating material will result in carbonization. Also ionization of air in a void will form various nitrogen-oxygen combinations, such as NO, N_2O_2, N_2O_3, N_2O_5 and others. Of course, N_2O_5 is the most important, since in the presence of water it will form nitric and nitrous acids.

A-C Dielectric Loss

There are two pieces of equipment available for measuring this loss:

1. The Doble test set consisting of a 10-kv. test transformer with a means of adjusting voltage, an instrument case containing wattmeter, voltmeter and ammeter. This equipment may be operated from a 115-volt, 60-cycle convenience outlet. The power factor of the insulation is readily obtainable by one slide rule setting. The set also has safety switches, guard circuit and test leads. It is carefully shielded from electrostatic fields, which is an important feature required for use in the field. It is portable, compact and rugged, which makes it adaptable to field conditions. It is accurate beyond field requirements, constantly checkable in the field, and requires infrequent servicing. This set is available in different capacities and may be leased with the Doble Engineering Services.

2. The General Radio Co. has on the market a low-voltage bridge which can be used where stray fields are a minimum, and will make measurements of capacities up to 110 microfarads.

Bushing testing consists of applying the test voltage to the bushing terminal of an oil circuit breaker, and to a transformer bushing with the winding lead disconnected. This is known as a standard or power factor test. The "hot collar" test with Doble equipment consists of grounding the normally "hot" terminal of the bushing and applying the test potential successively along the bushing at recesses between the rain skirts and measuring the watts loss. Contact is made with the porcelain through a clock spring wrapped around the entire circumference of the bushing. The "cold collar" test consists of grounding this same spring with the bushing terminal energized. These collar tests are important and more complete information may be obtained on them and the multi-collar tests from the Doble Engineering Co.

Some of the various types of bushing faults which may be detected are:

1. Moisture at various stages of penetration due to faulty or aged gaskets or to faults in porcelain casing.

2. Carbonization of compound or other insulating material due to corona discharge in voids or insulation.

3. Cracks or pin holes in the porcelain weather casing which are not visible.

4. Disconnected ground shields.

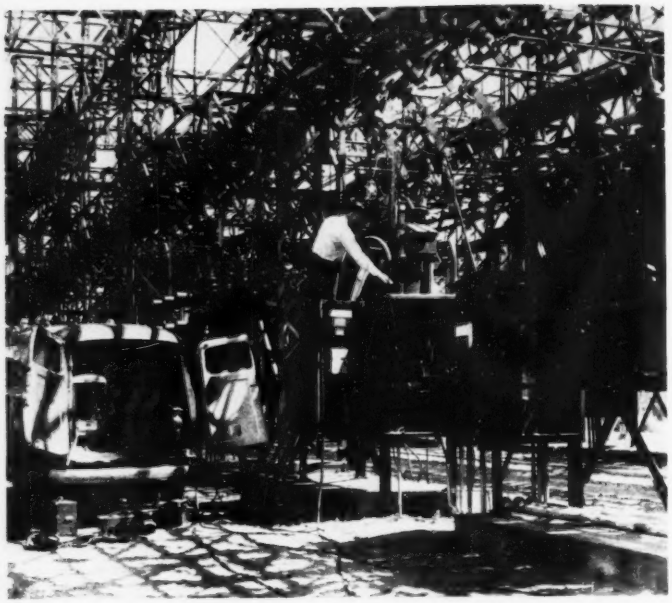
5. Compound leaking out of bushing into breaker or transformer tank. The mixture of transformer oil with the bushing compound will also raise the power factor and be detected.

In view of the above factors which affect dielectric strength of organic insulation, the following advantages of the a-c dielectric loss test may be listed:

1. The a-c test will indicate deteriorated insulation when there is a layer of good insulation in series with one of several layers of bad insulation since it requires only a capacitive circuit.

2. The a-c test has a common denominator in the form of a ratio (per cent power factor) or R/Z. With the bridge circuit this will be the cotangent R/X which is essentially the same as PF or cosine at lower power factors. Either is independent of the amount of insulation.

3. The a-c test also provides a measure of capacitance and dielectric loss useful in the diagnosis of the deterioration of many forms of insulation.



Preventive maintenance equipment used by Public Service Company of Colorado is shown above. Panel truck serves as a convenient means of housing and transporting equipment used for periodic preventive maintenance testing of bushings, oil circuit breakers, transformers and other electrical equipment

TABLE I

Suggested Power Factor Limits
For Instrument Transformers

Instrument Transformer Type	Power Factor by Doble Set		
	Normal	Investigate	Remove
GE E 15	3.5	5.0	7.0
GE E 115	3.5	5.0	7.0
GE E 116	1.5	3.5	6.0
GE P		3.5	5.0
GE KF 325Y	5.5		
GE K 30	3.0	5.0	6.0
GE K 31	1.5	3.0	5.0
GE E 21	2.0	3.0	6.0
GE K 32	2.0	3.0	6.0
GE K 60			
GE K 61	2.0	3.0	5.0
GE K 202	2.0		
GE K 203	2.0	3.5	5.0
GE K 204	2.0	2.5	4.0
GE K 201	3.0	5.0	
GE A 6	3.0	4.0	5.0
GE KF 315	7.0		
GE K 215	2.0		
GE KC 225	1.0		
GE KC 235			
GE KE	2.5	3.0	5.0
West. VC	1.5	3.5	8.0
West. OA	3.5	4.5	8.0
West. OB	4.0	6.0	
West. OC	1.0	3.0	5.0
West. OI	2.0	3.0	6.0
West. OT			
All Inst. Transf. by operating companies	2.5 to 3.0	3.5 to 5.0	6.0 to 10.0

Bushing Rating Data

A summary of facts and deductions drawn from data of the American Gas and Electric Service Corp., Doble Engineering Co., General Electric Co., Westinghouse Electric Corp., 32 utility operating companies, and the Public Service Co. of Colorado, follows:

1. 80% of the faulty compound filled bushings of a typical group had high collar readings.

2. 50% of those bushings having high collar tests were not indicated faulty by the power factor readings. Therefore, it is possible to miss a defective bushing by omitting the collar test.

3. Moisture in the cement spaces between porcelain and top hardware apparently does not cause a high collar test.

4. Cracked porcelain will cause a high and usually an exceptionally high collar reading, but not necessarily a high power factor.

5. Moisture in either the porcelain or compound of a bushing will cause a high collar as well as a high power factor reading.

6. Pin holes and porous spots in the porcelain will cause high collar readings, but not necessarily high power factors.

7. Some bushings with collar tests as low as .25 watts have proved to have badly cracked porcelains. On the other hand some of those with very high collar tests have had no faults that could be observed visually. However, it appears to be very important that all bushings with outstanding collar tests be investigated.

8. With a few exceptions, certain deductions can now be drawn from the collar results:

a. Very high "spot collar" tests probably indicate a cracked porcelain or one with pin holes.

b. High collar values at several points throughout the bushing indicate faulty insulation and would no doubt also cause a high power factor.

9. It appears advisable to remove all bushings with high collar tests; check the porcelains for leaks by air pressure or some similar method; dry out, if necessary, and replace all gaskets.

10. The high collar test seems to be a forerunner of a fault that might eventually cause a high power factor and ultimate bushing failure if the fault is not corrected. Therefore, its greatest advantage appears to be that in general a fault will be detected sooner by the use of the collar test than by power factor alone.

Hot Collar Test: watts loss of less than .15—rate (good); watts loss of between .15 and .50—rate (deterio-

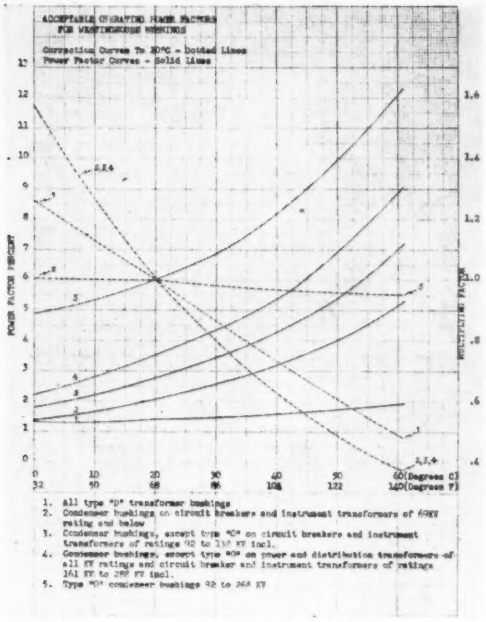

ACCEPTABLE OPERATING POWER FACTORS
FOR WESTINGHOUSE BUSHINGS
Correction Curves To 20°C - Dotted Lines
Power Factor Curves - Solid Lines
POWER FACTOR PERCENT
MULTIPLYING FACTOR
0 10 20 30 40 50 60(Degrees C)
32 50 68 86 104 122 140(Degrees F)
1. All type "D" transformer bushings
2. Condenser bushings on circuit breakers and instrument transformers of 69KV rating and below
3. Condenser bushings, except type "C" on circuit breakers and instrument transformers of ratings 92 to 138 KV incl.
4. Condenser bushings, except type "C" on power and distribution transformers of all KV ratings and circuit breaker and instrument transformers of ratings 161 KV to 287 KV incl.
5. Type "C" condenser bushings 92 to 368 KV

Fig. 1. Curves for acceptable operating power factor for Westinghouse oil circuit breaker and transformer bushings

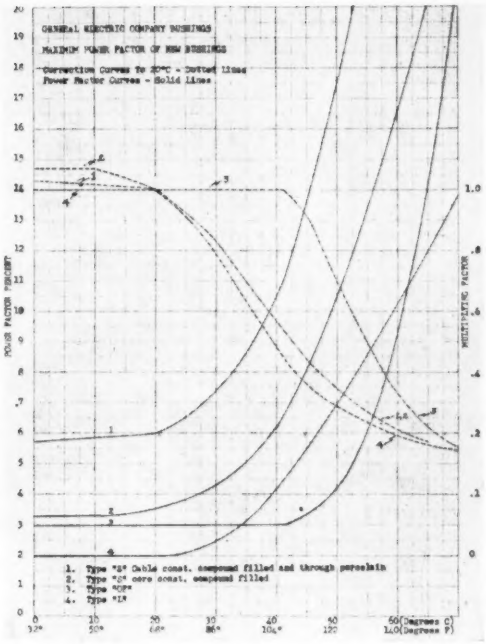

GENERAL ELECTRIC COMPANY BUSHINGS
MAXIMUM POWER FACTOR OF NEW BUSHINGS
Correction Curves To 20°C - Dotted Lines
Power Factor Curves - Solid Lines
POWER FACTOR PERCENT
MULTIPLYING FACTOR
1. Type "G" Cable const. compound filled and through porcelain
2. Type "G" core const. compound filled
3. Type "G"
4. Type "U"
0 10 20 30 40 50 60(Degrees C)
32° 50° 68° 86° 104° 122° 140(Degrees F)

Fig. 2. Maximum power factor for G-E Co. new bushings

rated); watts loss over .50—rate (bad); if over .15, remove cap and test for moisture with hot rod.

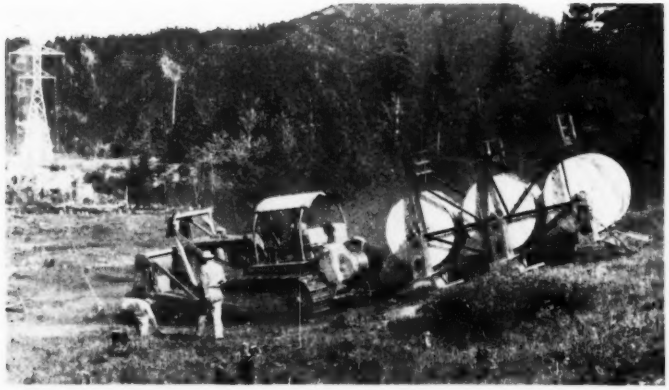
Cold Collar Test: watts loss of less than .15 more than standard test—rate (good); watts loss of .15 to .50 or more than standard test—rate (deteriorated); watts loss of more than .50 more than standard test — rate (bad).

For more accurate collar tests, grease collar on side towards porcelain with petrolatum to exclude air. The dielectric of the petrolatum is very close to that of the insulating material.

In case excessive surface leaking is suspected, the bushing should be cleaned and polished. If gasoline or carbon tetrachloride is used, great care should be taken to remove film left after evaporation, as this film is a conductor and a flashover may result. Soap and water is a better and safer cleaning agent.

Broken strands of flexible leads and sharp corners on bands introduce additional corona loss which appears as an in-phase component, the same as moisture or carbonized compound or internal factor angles and raises power factor.

Fig. 1 shows acceptable operating power factors of Westinghouse bushings. Fig. 2 shows maximum power factor for General Electric Co. new bushings. The solid lines on these curves represent the power factor of the several types of bushings, and the dotted lines are correction curves applying to the different types. Table I lists some power factor values for various instrument transformers.



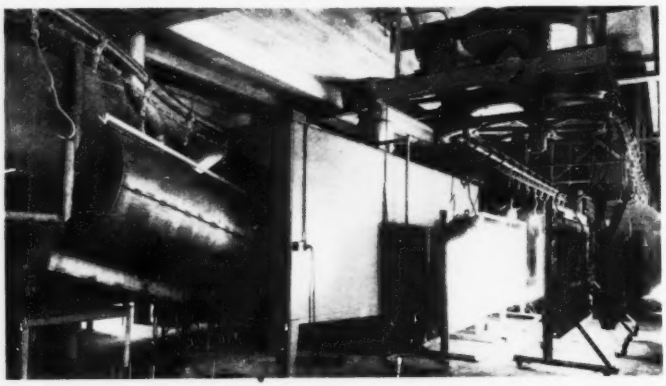
Reel Tension Sled

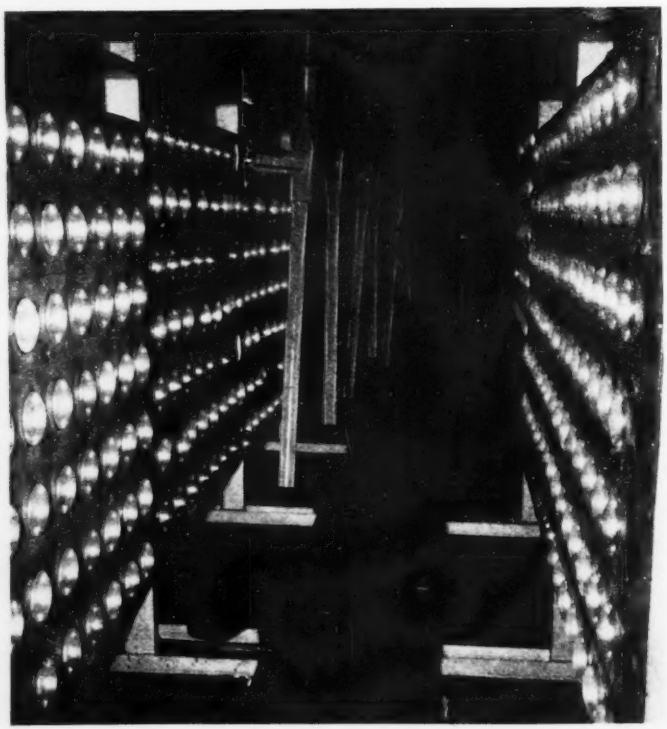
Use of the reel tension sled shown effected appreciable savings for the contractor building a 230-kv. line from Foster Creek on the Columbia to Snohomish substation near Everett for the Bonneville Power Administration Three reels carrying the ACSR conductor are mounted on a sled of welded steel framework with tubular skids. Each reel is separately braked to hold tension in the conductor and keep it off the ground. The equipment was manufactured by Stemm Bros. Inc. of Leavenworth, Wash., for use by Parker-Schram, contractor on the new line.

NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION

Utilization Data Sheet No. 60

SUBJECT: Assembly Line Paint Drying
SERVICE COMPANY: Idaho Power Co.
DATA PREPARED BY: Earl E. Haroldsen, industrial engineer
CUSTOMER'S NAME: Olson Manufacturing Co., Boise, Idaho
TYPE OF BUSINESS: Farm machinery manufacturing, principally "Olson Roto Beater"





Purpose: The slowness of paint drying, especially on damp days and during the winter months, delayed the assembly of finished parts coming from the paint line. An infrared-heated drying tunnel eliminated this trouble. This installation is used in connection with a modern waterfall spray bath. The complete operation is performed on a continuous traveling chain taking the work through sand blasting, cleaning bath, washing bath, warm air drying, prime coat painting, finish coat painting and infrared drying tunnel. The painted parts then go directly to the equipment assembly line.

The paint used is a special agricultural and industrial enamel, manufactured by Sherwin-Williams and Glidden Paint Co., made to finish with one coat on top of the bonderizer.

Description: Six banks of 250-watt R40 drying lamps are used. There are three banks on each side of the assembly line which has variable-speed control and travels two to three feet per minute. The complete installation was fabricated by the customer and consists of 336 lamps, 8 lamps per row with 7 rows in each bank. Each bank is adjustable in height to accommodate different sizes and shapes of painted parts. This adjustable drying space can be varied to accommodate small items such as braces and large pieces of equipment up to four feet in diameter from an overhead bus duct.

Realized Advantages: The equipment assembly line can now be run independent of weather. Frederic J. Cochrane stated, "Present production rates would be impossible without this infrared drying installation."

Operating Data

Average number lamps in service	300
Wattage per lamp	250
Average demand	75 kw.
Average usage (30 hr. per week)	130 hr. per mo.
Average monthly consumption	9,750 kwh.

Johnston Rankin

Loiseau Corette

Clark Heffelman

Sell, and Freedom to Sell—at RMEL

TAKE your story to the people—with redoubled vigor and in the simplest possible terms. This in essence is what speaker after speaker, with no prearrangements, told the 250 people attending the Rocky Mountain Electrical League 46th annual meeting at Estes Park, Colo., Sept. 11-13. The formula was recommended for combating creeping collectivism, for building a solid block of understanding friends for the electrical industry and for capitalizing on the unfulfilled public demand for electrical service and appliances.

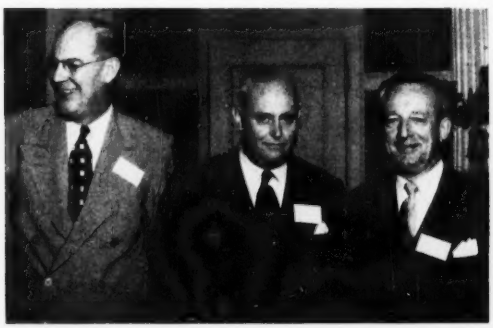
Elmer E. Lindseth, president of EEI, presented a vigorous 8-point program for fighting the trend toward a socialistic state. He urged: (1) That each individual dedicate himself to work for freedom. (2) That each get informed. (3) That recognition be given to the fact that proposals for reforming the economy spring from real problems. (4) That we be in favor of the right things, not merely against the wrong things. (5) That we develop a positive and convincing story. (6) That we tell this story at every opportunity to employees, customers, neighbors and friends. (7) That each individual take a personal interest and personal action in government. (8) Demonstrate by performance we truly deserve the complete confidence of the public.

"Preserve private enterprise by being more enterprising," was the recommendation urged by J. L. Singleton, Allis-Chalmers vice-president. Establishment of standards by which each economic or social proposal may be measured in terms of its individual contribution to collective socialism is a vital necessity, he said. Pointing out that opportunities are made rather than handed out by government, he outlined a $200,000,000,000 construction backlog of business potential for the electrical industry.

A grass root local approach rather than a political approach to the industry's problems is essential, George C. Tenney, ELECTRICAL WEST editor, told the meeting. He cited a recent policy declaration of the British Conservative Party which admitted impotence to denationalize British industry even if the party is returned to power. "Our inability to defend free enterprise stems from lack of knowledge of its social, economic and historical implications," he said. "We need a basic understanding of human relations coupled with a simple, easily remembered story to fight against statism."

J. E. Corette Jr., vice-president of

Singleton Lindseth Tenney



Scaife Vining Smith

Montana Power Co., pointed out that unless the federal government concentrates on worthwhile projects in resource development, it will wreck the American economy. The $57 billion water and power resource projects brought to light in the Hoover Commission report, if paid off in 50 years would require an annual tax contribution of $52 per family, he said, in contrast to a family electric bill of only $47 per year.

One of the voluntary or discretionary obligations of the utilities is the telling of a sound and understandable story of company, industry and the American enterprise system, J. E. Loiseau, president, Public Service Co. of Colorado declared. Facts the public should know about the light and power business, he said, include the 3.3% discriminatory federal energy tax, the lack of regulation of political electric operations, the 20% tax contribution of private companies and the significance of the preference clause in laws dealing with public power.

An outstanding group of presentations dealing with sales and merchandising was featured in a session attended by a large delegation of retailers. G. H. Smith, vice-president and general manager, Deepfreeze Division, Motor Products Inc., declared that the test of real sales ability will come when the full productive capacity of American industry goes to work. He cited a recent study of 5,000 electrical appliance purchasers as a guide to dealer sales strategy: 84.9% of the sales involved a mutual decision of husband and wife. Only 8% were made within a week of first shopping—66% were made between one week and six months after shopping; husband and wife together shopped in 63% of the cases; only 23% looked at one product—76.3% looked at an average of 3.3 different makes; in 90% of the sales there was no outside dealer salesman contact.

Arthur Scaife, merchandising manager of the General Electric's traffic appliance division, told the dealers to do well what they already know about effective selling. Among proven steps in selling he listed the following: thorough knowledge of product, understandable use of "gimmicks," a well-rehearsed sales story, complete demonstration and sound reasons for purchase by the customer.

Most problems relating to selling are imaginary, according to S. E. Vining, Westinghouse merchandising consultant. He urged: (1) Instilling in young people a desire to sell. (2) Holding of schools to teach dealers how to handle salesmen. (3) Teaching salesmen that selling is fun for them and that buying is fun for the customer. (4) Training young people so they become part of the business.

What to do in the fight for freedom was emphasized in two outstanding features. One was a discussion of Americanism by Nathaniel Leverone, chairman of the board, Automatic Canteen Co. The other was a NAM motion picture, *The Price of Freedom*.

W. D. Johnston, Mountain States Power Co. manager at Casper, Wyo., was elected president. New vice-presidents are J. W. Cryder, Colorado Central Power Co.; M. C. Heffelman, Public Service Co. of New Mexico, Santa Fe; Hugh Lenhart, Cheyenne Light, Fuel & Power Co., Cheyenne; Sam Harding, Graybar Electric Co., Denver. C. S. Sterne, Arvada Electric Co., Denver, was re-elected secretary.

IAEI

Puget Sound Chapter, IAEI, discussed code matters and inspectors' problems at its regular chapter meeting on Sept. 10

Oregon Chapter, IAEI, opened its fall term on Sept. 9 with a dinner meeting and special program arranged by the power companies in Portland. Financing of a delegate to the annual section meeting was arranged. Chapter will meet on the second Friday of each month.

Utah Chapter, IAEI, met for its first fall meeting on Sept. 13 to hear Vernon Proctor, apparatus specialist of General Electric Supply Corp. in Salt Lake City, discuss unusual electrical phenomena. Members discussed a group insurance plan for the chapter.

Both annual meetings of the Northwest and Southwest sections, International Association of Electrical Inspectors, will be held early in October, the Northwestern at Butte, Oct. 3-5; Southwestern, San Diego, Oct. 10-12. They will be reported in the November issue.

IES

Mother Lode Chapter of IES has elected Ralph Thatcher, illuminating engineer of the Sacramento Municipal Utility District, as chairman for the year beginning in October. Vice-chairman is L. E. Barnum, district representative, General Electric lamp department; secretary-treasurer, Elmore J. Duffy, sales representative, WESCO; managers, Clark Baker Jr., illuminating engineer, Wismer & Becker Co.; Doyt Early, AIA, state division schoolhouse planning, and A. L. Perdue, ex-officio member.

Mother Lode Chapter, IES, installed new officers on Sept. 15 at its new meeting place in the Elks Club dining room in Sacramento. Guest speaker at the dinner meeting was Fred Wellhouse, lighting engineer of Westinghouse, with an illustrated talk showing the principles of applying light for accident prevention on the highways.

A talk on lighting maintenance by W. C. Abrams, Eveready Electric Co. of San Francisco, highlighted the first fall meeting of the Northern California Section of IES at the Engineer's Club of San Francisco.

Manufacture and use of glass in optical instruments was demonstrated with a sound film by Leo Chaffin, Portland General Electric Co., at the first fall meeting of the Oregon Section of IES.

A traveling study club is being planned by the Oregon Section, Illuminating Engineering Society, as a means of bringing the society to such cities and areas as Albany, Medford, Astoria, etc. Purpose also is to establish local representatives in the various cities outside of Portland.

Only Westerner on the program of the Illuminating Engineering Society annual technical conference, at French Lick, Ind., Sept. 19-23, was Prof. Dan Finch, University of California, who is chairman elect of the Northern California Section. Prof. Finch gave a paper on "Lighting Design for Night Driving."

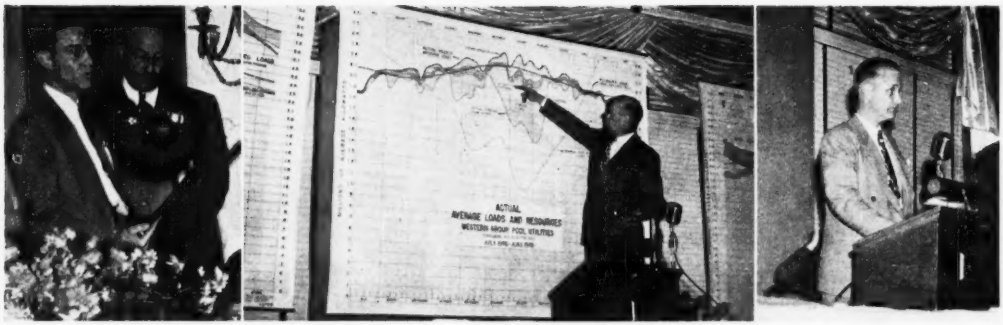
New developments in fluorescent lamps were discussed by G. B. Buck II, illuminating engineer of General Electric lamp department at the Utah Chapter, IES, meeting on Sept. 23 in Salt Lake City.

NAEB

Principal speakers at the National Association of Electrical Distributors (formerly National Electrical Wholesalers Assn.) Pacific Zone convention at Hotel del Coronado, Coronado, Oct. 17-19, will be Theodore Karl, consultant in employee relations of the Sales Analysis Institute, San Francisco, talking on "Employee Relations"; Charles G. Pyle, managing director of the association, on "Care and Feeding of the Golden Goose"; and George C. Tenney, editor, ELECTRICAL WEST, on "A Sure Road to Ruin." (Convention will be reported in the November issue.)

Bureaus

Headed by E. W. Meise of San Diego Gas & Electric Co., the Bureau of Radio & Electrical Appliances of San Diego County is planning an intensive lamp campaign to break in mid-October and continue through November. Committee working on plans is composed of lamp bulb manufacturers and distributors in the San Diego area.



President Carl Moore presents McGuire Award to Eugene Hoffman at left; Clint Hurd points to possible power shortage this winter, center; Host, C. A. Erdahl, Tacoma Commissioner of Public Utilities, welcomes the convention, right

NW Public Power Assn. Wants CVA, but—

MUNICIPALS and PUDs too wish to retain their independence from the federal government. This was stated many times and was the background for reservations to outright endorsement of a Columbia Valley Authority at the annual meeting of Northwest Public Power Assn. at Tacoma, Sept. 14-16. That and a possible wholesale power rate increase from Bonneville Power Administration were the two chief worries of the 281 who attended this largest meeting of the group of 63 public and cooperative electric systems in Washington, Idaho, Oregon and Montana. Carl C. Moore, manager, Stevens County Electric Cooperative, president, presided.

On the positive side was an excellent engineering and operating session; on the political side an address by Washington State Congressman Henry M. Jackson and a lesson in propaganda techniques by an Oklahoma REA paper editor.

CVA endorsement came to the floor of the second day's business session as a recommendation from the legislative committee. Proud of their record and pioneering of public power in the Northwest, Seattle and Tacoma managers found that no draft so far proposed for a CVA protects the autonomy or the right to growth of their systems. They could not feel the trust that some of the newer PUD spokesmen expressed that the federal government would administer CVA fairly, especially should an unfriendly Congress be elected sometime. After debate that carried over into afternoon, CVA endorsement was voted with five reservations proposed by J. Frank Ward, Tacoma City Light superintendent:

1. CVA legislation should provide no plan that would prevent development by any local agency of projects predating the act or later to be built.

2. Any project in the Columbia Basin Plan should be made available for construction by any local agency other than the federal government on a showing of financial ability to carry on such a project.

3. Any generating facilities obtained by the federal government should be made available for purchase by local agencies of government in the same way that provision is made for sale of distribution facilities.

4. One or more local agencies should be permitted to construct a multipurpose project, financing its power facilities, the federal government financing and operating the other multipurpose facilities.

5. When costs of construction have been paid by electrical revenues, the power facilities involved become the property of the state or local agency.

Dr. Paul Raver, administrator, BPA, broke the news about rates at the final session. Required by law to review rates each five years, he said, it was now being done by his staff. Certainly by 1954, the next five-year spot, because of the increased construction costs of new projects being added to the system, their remoteness and the necessity for longer transmission lines and more distribution facilities, it was reasonable to expect an increase of wholesale rate of from $4 to $5 per kilowatt-year over the present $17.50. He could not as yet promise no increase this year. Studies are not yet completed. It might be necessary, in anticipation of cost increases in this next five-year period, to make some upward adjustments.

When he speculated that the small PUD customer might not be increased but the large, high load factor customers who enjoy the best rate because of load factor (municipals such as Seattle and Tacoma, private companies and aluminum companies) might be increased, this drew protest from Seattle and Tacoma. They maintained that such a trend would discourage their own expansion, local control, tend to make Bonneville the sole supplier.

The power outlook for this coming winter was put straight to the public power group by both Clint Hurd, former manager, Cowlitz County Public Utility District, and by Lester Cowgill, engineer for the Northwest Power Pool. If rainfall and snow is normal or median, the region as a whole may be able barely to squeeze through. If it proves a dry year, there may be as much as 250,000 kw. short of meeting average estimated load, not counting peaks. Hurd emphasized the need for all utilities, public and private, to cooperate and share alike in a crisis.

Improving electric distribution systems was first topic in the engineering and operating section first-day session, with Owen Hurd, manager, Benton County PUD, as chairman. Pole trends, present and future, were handled by a panel. Lincoln H. Mueller, forester, Forest Utilization Service, Missoula, noted a trend toward more species used as poles because of depletion of stands of cedar and chestnut. Better knowledge of species, improved treating methods, better harvesting overcome previous disadvantages to other species. Mechanical

Ford Northrop Carl Moore James Everhart Robert Reese

barkers improve pole treatment and make for longer life. M. H. Sperry, Valentine Clark Pole Co., Newport, discussed treating improvements and new preservatives such as "Penta." V. C. Monahan, Cascade Pole Co., Tacoma, elaborated on mechanical barking. He also spoke of development of round crossarms and hardware for them. V. P. Campbell, former pole man, now manager of Pend Oreille County PUD, spoke of overcoming prejudices to Western larch, both on the part of operators and of linemen. Shaving has made such poles less hard to climb.

Modern trends in distribution transformer design were outlined and illustrated for the group by James G. Everhart, chief transformer engineer, Line Material Co., Zanesville, Ohio. Smaller tanks, better insulating materials and oils, use of oxidation inhibitors, use of oriented steel for cores have provided better performances with less weight, yet with higher loading. Simplified appearance, inverted T design for duplex single and 3-phase loads, and higher voltage for rural lines were other trends he spoke about.

Robert Reese, engineer, Grant County PUD, Ephrata, showed drawings of transformer mounting methods for several types of service, designed to hold cost down yet provide safety, be removable.

A similar panel on substation standardization and unit substations began the afternoon session. John Nelson, Seattle City Light, was its chairman. L. B Robinson, General Electric Co., described the evolution of the unit substation in a package. John Barkle, Westinghouse Electric Corp., East Pittsburgh, reviewed the five basic distribution systems and said the trend was toward replacement of haphazard systems with either the radial or loop system and toward factory assembled substations. Sol Schultz, BPA, explained that, because of the variety of systems supplied, Bonneville was seeking to achieve voltage standardization and eliminate costly intermediate voltages. Hence it had developed substation design which, while not a manufactured package, was standardized so that BPA could obtain materials on short notice, purchase in quantities, have high salvage value for reuse in other locations. Nelson recounted Seattle's experiences with unit substations, which had proved more economical in first cost and had made maintenance of non-attended substations uniform.

O. B. Falls, General Electric Co., followed with an illustrated discussion of modern distribution system design. His paper may later be published herein. It was comprehensive, covering voltage spread, balancing of primary and secondary loads, regulation, use of capacitors, transformer loading, wire sizes and multigrounding.

Need for a permanent engineering and operating section of the association was expressed by many. Owen Hurd declared, "The Crusading days of public power are over. We are into the management and operating phase and must take our place in that." Gus Norwood, executive secretary of NWPPA, told of the benefits from creation of an accounting section. He also sought to determine just where members wished NWPPA to fit in among the many overlapping public power associations, REA associations, PUD associations, which drew heavily on time and expense of commissioners, managers, engineers.

At the business session, Thursday, President Moore noted the increase in public power, particularly in Washington where 54% are now served by public agencies; 83% will be with full acquisition of Puget Sound Power & Light. He recommended a consumer paper be considered in addition to the members' bulletin. Norwood in his report commented on the high rate of manager turnover among PUDs and called for analysis of the causes. The committee on wages and working conditions, under Paul Hand, was reported exploring the scope of labor negotiations the association might attempt and whether an area rate might be established; whether compulsory arbitration should be sought. Eric Johnson, Wasco Electric Cooperative, The Dalles, spoke of a safety training program with Oregon state aid. A resolution asking for a clarification of policy on streams and fish propagation passed and so did one urging regulations to keep substandard and unsafe appliances off the market. Objections were raised to the electrical workers safety orders being proposed at the Department of Labor at Olympia, Wash., and a delegation was sent to protest and to seek representation on revisions of the rules. It was said that the unions had written the rules.

Officers elected for the ensuing year were: Ford Northrop, Eugene, Ore., municipal plant, president; Max Schmuck, commissioner, Clallam County PUD, vice-president; John King, Seattle City Light, treasurer. Gus Norwood, executive secretary, is appointed by the board of trustees. Trustees elected were: Washington—Robert Jones, councilman, Seattle; C. H. Erlandson, commissioner, Snohomish County PUD; J. F. Ward, superintendent, Tacoma; Jon Fisher, Lincoln Electric Co-op., Davenport, Oregon—M. H. McGuire, manager, McMinnville Water & Light; Paul Hand, Central Lincoln PUD; Vilas Sheppard, Clatskanie County PUD; Clarence Belnap, Lane County PUD. Idaho—John George, REA, Culdesac; W. L. Jansen, Fall River Co-op, Rexberg; Ken Lemley, Kootenai REA; H. M. Buroker, Bonners Ferry. Montana—R. H. Gatiss, Flathead Electric Co-op, Kalispell; Harold Ebaugh, Hill County Co-op; Howard Babcock, Vigilante Electric Co-op, Dillon; Ed Williams, Fergus Electric Coop.

PANORAMA OF THE PCEA

Edited by A. X. Schilling

Fall Conference Program

During their meetings on Aug. 31, the three guidance committees set up an outline of the program for the Fall Conference at Fresno on Nov. 17 and 18; the suggested program was approved by the board of directors the following day.

The conference will open on Thursday morning, Nov. 17, with a general session in the Hardy Theater and will be followed by a luncheon featuring T. Fort, manager, apparatus sales, Westinghouse Electric Corp., Pittsburgh, whose subject will be "Real Conservation."

The Administrative Services Section will meet Thursday afternoon and all day Friday in discussion groups that will consider the following topics: rates, including evaluation and statistical; accounting; credits and collections; purchasing and stores; finance; and personnel. The section will introduce a new discussion group this fall, devoted to rights-of-way.

The Business Development Section will conduct parallel sessions on Thursday afternoon, consisting of the following: advertising committee; electrical living committee, and its subcommittees on home economics, residential lighting, kitchen and laundry, television, and adequate wiring; commercial lighting committee; agricultural load-building group; industrial power; heating and welding group. The section will meet as a unit on Friday.

The Operating Economics Section will hold parallel sessions on Thursday afternoon and all day Friday. The following groups will conduct separate meetings: safety committee, communications committee, hydro generation group, steam generation group, meter group, transportation group, substation group, and the transmission and distribution group, which this year will operate in two sections—underground and overhead.

Diversions on Thursday evening will include a dinner sponsored by the Business Development Section and an entertainment in the Power Building Auditorium sponsored by the San Joaquin Power Club.

During its meeting on Sept. 1, the board of directors appointed J. H. Pengilly as a director to serve the unexpired term of I. W. Borda, who resigned that office as a result of his election as president. Pengilly is a vice-president of the Square-D Co. The board also appointed R. W. Turnbull, General Electric Co. commercial vice-president, to serve the unexpired term of A. G. Jones, who resigned as a director because of his retirement on Oct. 1 as manager of General Electric's apparatus department, San Francisco.

J. F. Pollard was appointed to serve as assistant treasurer. N. R. Sutherland is treasurer.

More Committees

Supplementing our listing of last month, here are some more committee personnel:

Home economics committee, Marjorie Harper, chairman; Francis Alexander, Lois Cline, Marguerite Fenner, Lois Ferris, Pauline Eliker, Ruth Kruger, Patricia Murtaugh, Marguerette Reinhart and Molly Sylvester.

Kitchen and laundry committee, K. L. Hampton, chairman; F. C. Doyle, Fred Fenton, A. C. Miller, E. B. Barnes and E. M. Tallon.

Television committee, J. Clark Chamberlain, chairman; A. C. Miller, vice-chairman; Parschall Henry, George Korntved, Don Piper, L. J. Perkins, Marty Sauer, F. E. Gilbert, Vere L. Ringle, J. T. Templeton, F. Lowell Garrison, M. G. Sanders, Larry K. Devlin and Stuart Paine.

Nominating committee, M. G. Sues, chairman; A. E. Holloway, H. L. Harper, J. H. Pengilly, D. D. Smalley, C. W. Goodwin Jr. and T. L. Rosenberg.

Budget and finance committee, R. N. Dreiman, chairman; Harold Quinton, H. H. Courtright, M. G. Sues and N. R. Sutherland.

Membership committee, E. H. Galchutt, chairman; H. A. Lee, vice-chairman; James Stetson, W. M. McKenney, G. R. Best, L. G. Berger, C. W. Dysinger, T. T. Kennedy, Arthur Dahl, W. L. Winter, A. L. Pierce, Gordon F. Black, James Longley, E. A. Long, L. G. Peck, J. A. Long and S. R. Robinson.

Code and ordinance committee, K. M. Ryals, chairman; G. F. Maughmer, vice-chairman; M. K. Bliss, W. E. Boyd, H. L. Gerber, O. E. Keeler, A. C. Miller, F. E. Strauss, Calvin L. Gleason, P. L. Mullenbach, R. E. Arbogast, J. W. Barry, Harry L. Harper, Ross Hartley, Sidney F. Hill, R. J. Walker, G. F. Wismer, H. C. Rice and D. E. Harris.

● DURING recent months, Kern County and the cities of Lodi, Sonoma, and St. Helena have adopted the Uniform Electrical Code. The Code now has been adopted by 119 cities, 6 counties and 1 fire district.

● V. W. HARTLEY, PCEA's managing-director, attended the convention of the International Association of Electrical Leagues in Cleveland, October 12 to 15.

● ARTHUR KEMPSON, who has served as PCEA's field representative in southern California since October 1940, retired on June 30, 1949.

Electric Clubs

Portland Electric Club held a kick-off luncheon on Sept. 8 with Eugene Caldwell, vice-president of Hyster Co., as guest speaker.

Electric Club of San Francisco opened its first fall meeting with an Old Timers' Day luncheon on Sept. 12 . . . Following week R. E. Fisher, recently returned from nine months in Italy where he was in charge of fuel, power and transportation for the ECA mission to Italy, gave "an electrical man's impressions of that country." Chairman of the day was O. R. Doerr, Pacific Gas and Electric Co.

Electric Club of Washington has scheduled its meetings for the first and third Mondays of each month at the Town & Country Club in Seattle. Held its first fall session on Sept. 19.

East Bay Electric Club opened its fall season with a television talk from Russ Coughlan, program director of Radio Station KROW, on Sept. 19.

ELECTRICAL WEST

Public Power's Responsibility

"CRUSADING days for public power are over. We are now in the operating phase," said one PUD manager in advocating the formation of an engineering and operating section in the Northwest Public Power Association, at its Tacoma convention. In a sentence he thus recognized the responsibility that has fallen upon public power. After the smoke of battle clears and the thrill of victory fades, a public body finds that it has a utility system to operate. Just what does one do with a utility system, once it is acquired? It looked so easy—but is it?

Setting aside the ideological fervor, which was useful in "driving them out of business," as Congressman Jackson bluntly put it, the know how which the private companies learned by some 50 years of hard experience, must somehow be brought into the operation of the recently acquired PUD systems. Their association thus is some 25 years behind the associations of the private companies which have exchanged know how and techniques and pooled their experience. It was this that made it look so easy.

One of the first hard lessons the managers and operating engineers of public power systems are learning, (the high rate of turnover of managers indicates it) is that it takes a different kind of people to crusade and campaign from those who are best at operating. Unfortunately for them their management or directors or commissioners are most likely to be the former and have little appreciation of operating detail. Looking back over history, the zealots tire of unexciting operation, seek some new crusade and leave to the operators to live with the utility system.

It is not going to be easy for the operating men to live up to the promises made in the heat of the campaign—lower rates and local control. In achieving "local control" the large systems, which economy of operation consolidated, are broken up into many smaller units. Each of these must take unto itself all of the overhead brought about by consolidation.

In the immediate future Dr. Raver warned of wholesale power rate increases from Bonneville too. Labor, having supported the political overthrow, makes excessive demands as its reward. (In one case a strike was called to fire a PUD manager.) Taken over in the flush period of power shortage and hence of great demand, none has yet faced load-building costs which future surpluses will impose. So it will not be easy to operate in the black even with tax evasion.

Earnestness and good intent are not enough alone to operate a utility system. The sale of the theory, the ideology, has won the public power proponents an opportunity — and a *responsibility*. The sale of electricity is much more realistic. That phase is upon the public power agencies now in the Northwest. May their promises not embarrass them.

The Faith of Edison

IT is particularly fitting that on October 21 every man and woman whose livelihood stems from the electrical industry should pause and bow his or her head in grateful memory to Thomas Alva Edison. That day marks the 70th anniversary of Edison's invention of the incandescent lamp. That invention prompted him to develop a system of electric generation and distribution unknown at that time. And in so doing, he founded the modern electric light and power industry.

No industry in all man's history has fulfilled in equal or greater degree the dreams and promises of its creator. And few can hold forth greater promise of further achievement.

However, despite this promise, we have wondered with increasing frequency if the people in the industry today are inspired by the same faith that urged Edison forward during his difficult beginnings and which he carried with him to the end. Perhaps a restatement of some of Edison's philosophy might reindoctrinate the doubting and reinspire the discouraged. Here is what Edison said twenty years ago:

"I have been deeply impressed in observance of the magnificent proportions which electrical development has attained. This wonderful combination has been achieved through the labors of many men of many minds . . . I am proud of the electrical industry—of its vision, courage, zeal and devotion to public service; and I suspect every American feels the same way about it . . . The record is wonderful: but fine

EDITORIAL VIEWS

as it is, it can be made still better and I have a feeling that in your hands it will."

Even more significant was his last public utterance made in 1931 when depression and near panic threatened the nation. He said:

"My message to you is: Be courageous. I have lived a long time. I have seen history repeat itself again and again. I have seen many depressions in business. Always America has come out stronger and more prosperous. Be as brave as your fathers before you. Have faith. Go forward!"

With head bowed in tribute to this great benefactor, each of us might well repeat:

"We do have faith. We will go forward!"

Some Cooperation

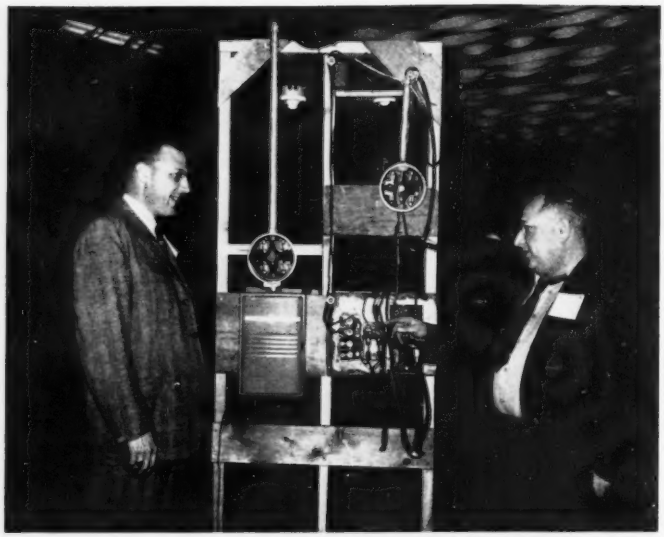
COOPERATION is a by-word in the electrical industry. Its benefits have been manifold and its abuses negligible. There has been one form of cooperation, however, which gives most electrical people bad dreams. This is the banding together of people or organizations into cooperative agencies for the avowed purpose of obtaining the benefits of tax evasion, subsidy or preferential treatment under the law. A recent *Wall Street Journal* story points out one such example. Speaking of a proposed $14 million REA loan to provide generating and transmission facilities for eleven REA co-ops, the Journal says: "Are these genuine cooperatives? Why certainly. Aren't the United States Treasury and its constituents throughout the land cooperating to lend the money at 2% interest? Can you point to any example of wider cooperation?"

No, frankly, we can't.

Nationalized Roman-Riding

SOME of the inherent competitive problems that develop in combination gas and electric utilities in this country have been compounded on a national scale in England. There the government became a "Roman-rider" with the vestment (takeover) of the gas utilities last May. Since that time those in charge of the electricity supply have sensed a slight preference on the part of the national ministries for their gas counterpart. Electric rates have been artificially raised by the imposition of surcharges to discourage use during peak periods; gas rates have not. The gas industry is permitted to use prepay meters; the electric industry is not. The gas industry has quarterly billing; the electric billing is monthly. And there are other preferential conditions. Well, it could happen here.

WE are in a constant state of flux, and it is entirely possible that in our time we may see the nationalization of industry and the complete socialization of American life. If that happens, historians will have every right to say that justice apparently triumphed and that the enterprise system, having exhausted itself in the struggle for survival, was finally retired in favor of something better tuned to the needs and desires of the people of the United States. If that happens, we will have no cause to complain. Like the Confederacy, we can then look forward to a long period of literary glory and romantic speculation. People will write books about us and our exploits. We will no doubt continue to live on in the movies—movies produced by the state with public funds. If nationalization of industry—electric power, steel, oil or anything else—happens to us, as it happened to England, it will be our own fault. We cannot fight it with words alone, but we can fight it with actions. This is a broad front like any front, and although a few feet of it such as you or I can usually see across our desks does not seem to amount to much, yet every foot of it is vital to our continued existence. Break-throughs are fatal. There is just one thing about such a prospect that puzzles me in passing. Socialized economies appear to stay alive principally by virtue of transfusions from healthy, capitalistic bodies, and after we are gone, I don't know where the transfusions are coming from. The world will have run out of convenient blood-banks, and it will be interesting to see what happens next.—Charles E. Wilson, president, General Electric Co.



Many customers of contractors in rural towns and on farms do not appreciate what a good wiring job consists of. In order to sell them on the necessity for having wiring done according to the Idaho State Code, E. I. Shaw, contractor of Shoshone, Idaho, has built an ingenious display board which contrasts a code installation at the left and the usual haywire job of the past. He is here showing it to Gene Fleming, G-E Supply, Salt Lake City, pictured at the left. Shaw says that it helps him sell a quality installation every time

● Illuminating Engineering Society announced its new series 14 of Lighting Data Sheets, available from IES headquarters for all who want latest information on various lighting installations.

● An Illustrated National Price Service is now offered by the Henderson-Hazel Corp., 5005 Euclid Ave., Cleveland, for more than 25 years publisher of the unillustrated price service. More than four years' work has gone into the illustrating of the thousands of items listed. The illustrations are ingeniously interleaved between the pricing sheets so that prices and related illustrations face each other. This loose-leaf arrangement makes possible changing price sheets without awaiting printing of new illustration sheets. Illustrations should make accurate identification of materials easier without recourse to catalogs. Illustrations will be kept revised when appearance of manufacturers' items change as prices are also

With two jeeps and trailers, each equipped with a full set of electrical wiring tools plus bins and boxes for wiring supplies, Lighthouse Electric Co., Pullman, Wash., travels the area providing fast and economical service on electrical contracting jobs. Pictured standing in front of one of the service rings are Harry Tuttle, M. Dale Gamble, Paul L. Briggs, owner, and Grant Piche

changed. The pricing service gives contractors net cost, manufacturer's list, standard package quantities and brief specifications of each item. A suggested resale price takes into consideration overhead and profit and may be used or not as a guide by the contractor.

An effective portable demonstration of the Crawford automatic door opener has been worked out by J. W. Earl Co., Logan, Utah. Instead of putting mercury switch under the ground, it is placed just under the car and electro magnet is mounted on the car above the switch. When operator pushes a button on the dash the current is closed and the operating motor is put into action to open or close the door. Claire Roberts, salesman, shows how it is done

ELECTRICAL WEST

Sales Guide

FOR THE ELECTRICAL MERCHANT OF THE WEST © OCTOBER, 1949

To Build Up Dryer Sales

Automatic clothes dryers, with a saturation of less than 1%, offer a wide potential selling market for every appliance dealer. Among owners of electric water heaters and washers, among prospects for the complete laundry, dryers stand prominently as a natural tie-in.

Promotionally speaking dryers have numerous benefits to play up. Here are some appeals to use when you're talking about dryers:

• **Weather problem** is ended. With a clothes dryer the worry of having good weather for drying clothes automatically ceases. There are comparatively few balmy summer days in the year that are ideal for drying clothes, and now during the damp winter days drying clothes out of doors is a major task and hard on the clothes. Strong winds and freezing weather will damage fabrics. The complete drying process is taken care of speedily and effectively with an automatic dryer.

• **Clean clothes** are assured when they are dried in a clothes dryer. They are free from soot, dirt particles and the fog of outdoors. Clothes come out white, fluffy and fresh-smelling in a dryer.

• **Health factor** is important in drying clothes. An automatic dryer sanitizes clothes even more effectively than sunlight. The heat of a dryer kills common germs.

• **Controlled heat** is provided with thermostats in a dryer. Clothes may be dried to a desired dampness for immediate ironing without sprinkling, or thoroughly dried. Many clothes need no ironing when they are completely dried and wrinkle-free after the drying process.

Don't overlook the dryer's many saving features:

1. TIME-SAVING. Clothes can be dried in a matter of minutes in a dryer, as compared to the hours it takes out of doors, and the time involved in hanging out and bringing in the wash. With a home laundry the entire washday process can be completed in a short time. One tub of clothes can be drying while another tub is being washed.

2. MONEY-SAVING. The operating costs on a dryer are reasonable. It is an investment that will reap weekly benefits for the owner.

3. LABOR - SAVING. The clothes line method of drying clothes is arduous work. Wet clothes are heavy to carry. With an automatic dryer there is no stooping or bending. Countless steps are saved in the laundry process.

4. SPACE - SAVING. In urban areas where space for hanging out clothes is a problem, the dryer is an ideal answer. The laundry can be started and completed in the kitchen or utility room.

Electrical West—Vol. 103, No. 4

"Give us men to match our mountains," said a poet. Likewise in the appliance business we need

Salesmen to Match our Merchandise

Says

Ken Hampton

AS merchandisers and salesmen of electrical merchandise, we are in an enviable position today.

Material developments, the perfection of manufacturing tools and processes and intelligent hard work have enabled the electrical manufacturers to build and deliver to us the best quality products the industry has ever known. We take great pride in talking among ourselves and to our customers about parts being machined to 1 10,000 of an inch—about steel being processed and painted so the device will not rust, the paint does not stain or check and the colors of various pieces match.

Each of you could add a multitude of examples to the list of near perfect manufacturing practices but—the fact we all would agree on is that the manufacturers of electrical goods are striving for and approaching the highest quality possible by taking full advantage of all the know how the human race has acquired in manufacturing. Contrast this condition of technical quality with the way the merchandising function is performed in our industry. For instance, let's compare the quality performance of our products with the performance of our sales force.

Merchandising is a function older than manufacturing. Salesmanship has been developed through the centuries. The rules for making a sale are as well defined as the rules for making a good product.

What is it then that places us in this position? What leads us almost universally to conclude that our retail salesmanship is as poor as our products are good?

I believe it is two-fold. First, our factory workers work in groups and have the advantage of group competition and standards. The salesman works alone with his customer whom he must get to part with some of his money for our products. Second, in our striving for freedom and individual initiative, we have surrounded salesmanship with the garb of magic, e.g. being a born salesman rather than accept the plain fact that it is **doing the right thing at the right time** according to **known rules.**

There have been many calls for recruiting good salesmen to our industry. The need for good salesmanship is tremendous. As merchants, let's build standards of perfection for our merchandising and salesmanship equal to the products we sell.

1. **Recruit a good sales force composed of men and women who are anxious to learn and who want to grow with the electrical business.**
2. **Hold these people to a standard of sales performance equal to the standards the manufacturers are setting for the quality of their product. This can be done by using the "know how" which the human race has developed on selling.**

Any product not thoroughly sold is poorly sold.

ELECTRICAL WEST Sales Guide

News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

October 1949 ©

Three strikes and out

Strikes may louse up an otherwise better-than-expected fall and winter business. Things were rolling fine all over the West at month's beginning. Warehouse strike in San Francisco had made deliveries tricky but that's over now. John L. let the Western coal miners get some coal out for winter but steel shut-down affects Salt Lake, Pueblo, and coast steel employment, may reach with shortages into next year's appliance crop. Strike cancer breaks out in other industries as old sores are cleared up.

Buy the pound?

Los Angeles dealers don't cut prices on television and appliances. They "devalue" them and put on a jolly British accent, don't ye know. San Francisco distributors say, "Don't try to buy television wholesale, you sap. You can dc better retail." But football has come to the rescue now and set sales make a forward pass.

Labeled lamps

Come Jan. 1st, Portland electrical inspectors will require all table, floor, bed and other portable lamps have Underwriters' listing before they can be sold there. Tests of local stocks revealed some pretty shoddy and unsafe lamp merchandise.

Hot subject

Washington State Commission hasn't ruled yet whether Pacific Northwest Utilities Conference request to deny electricity to new electric space heating customers will be upheld. It is watching to see how much rain there'll be for power this winter.

Blazing trail

Phoenix area dealers were told Sept. 20 Central Arizona Light & Power is "Back in Action" to help dealers develop a $9,700,000 appliance market. Lights, noise and six guns blazing announced the big new program. Executives assured dealers the company would sell directly only such appliances not profitable for dealers. (Story in detail next issue).

TV Expo

All of its steam will go into a big National Television-Radio Exposition, Oct. 15-23, at Shrine Convention Hall, Southern California Radio & Electrical Appliance Assn. decided. All 7 local TV stations, all distributors and dealers will participate, says Bill Quinn, managing director.

Color talk

Don't hold your breath 'til color TV comes. It's still two or three years off, even if there are lab models which work. Our Washington Bureau reports that CBS test was impressive but far from perfect. FCC is being plenty critical. Wants to be sure an ordinary mortal can operate a color set.

Other TV news includes: Sylvania introduced its own brand set in the East; will have national coverage by 1950, 7 models, built-in antenna, three-speed record changers. . . RMA is putting out TV spots to show set owners how not to treat their sets. . . G-E will bring out an 8½-in. TV tube, giving 50% more picture than 7-in. . . Motorola also has a 8½-in. in its line. Also a kitchen TV in white, and an improved 7-in. portable TV set. . . Television by Conrac, Glendora, Calif., originally a chassis-only idea, is expanding into a full line of cabinet console models in both 12½ and 16-in. sizes. . . Admiral TV sets will have a built-in directional antenna for "plug-in" reception. . . Westinghouse has a new combo TV console featuring the "electronic magnifier," with 10-in. tube and new three-speed record changer.

TV flashes

KRON, San Francisco's third station has put on test patterns, will be on the air in mid-November. . . TV sets will be counted too in the 1950 census. . . Fastest sales of TV sets per capita seems to be in San Diego where 900 sets sold last month. At this rate 10,000 estimate for the year will be topped soon. . . TV sales in the Los Angeles area cracked all monthly records in August with 18,188 sets sold, boosting total installations to 186,777. . . In San Francisco TV sales reached 654 for August, bringing total sets sold to 10,749. . . Ray Thomas Co., Los Angeles, staged a Capehart TV showing Sept. 28-30.

And more

NEWA, pardon us, National Association of Electrical Distributors, has issued a sales manual consolidating six of its Appliance Sales Boosters in color and cartoons. Inquiries should be made to NAED, 50^ Fifth Ave., New York 18.

Booster package

Electrical dealers and PG and E at Eureka staged the area's first big Appliance Show, Sept. 27-29 at the civic auditorium. Story next issue.

Timber!

Whether you like it or not, John Carson, coop publicity man, was affirmed on the FTC. Look for lots of "trust busting" from FTC soon.

Big game

Arvin is offering a $1 a week lay-away plan on all of its appliances, with free hurricane lamps (candle) as a prize.

Offer

A. C. Gilbert has a new mixer with twin nylon beaters.

"Beats all!"

Frigidaire sent Phil Bratton, its sales manager through the Northwest, Cec Prashaw, range and water heater manager, the Southwest, holding "range roundups" (of course, electric) featuring its new RM line, with many refinements. Whole price line seemed to be moved up in quality and features a notch.

Range roundups

H. Paul Nelligan, president both of Easy and of the National Home Laundry Manufacturers Assn., and Homer Reeves, Easy's v-p of sales, came West and Fred Fenton put them to work at two big dealer meetings, San Francisco Mart and L. A. Biltmore. Nelligan promised an automatic by early in 1950, a dryer soon thereafter and some day a dishwasher. Spin-dryers are still featured, with a new in-between model, two new wringers. Ironers have been rebuilt and a new one is due in 1950.

Easy promises

Jim Nance, Hotpoint president, is due West again in October. After an address at a manufacturers meeting at Palm Springs he'll address Los Angeles, San Francisco and perhaps Spokane meetings. He's out to get the utilities back into hard promotion of appliances. Did you know

Selling a return to action

Howard Scaife was back in S. F. as Pacific district manager, Don Rennewanz has opened a Pacific Northwest district with office in Seattle. Augie Jaeger is Western utility representative. New models are due for introduction before Christmas.

Bendix Washers "buried" the $299.95 model at dealer meetings held by L. J. Meyberg Co. Herb Atwater used showmanship to illustrate profits from a clothes (washing) line. — Quick and the dead

Always dynamic, San Francisco's Merchandise Mart played "musical chairs" last month. Philco switched distributors, dropping Thompson Holmes, moving to Dalco. Because McCormack & Co. is moving out, a rumor started Admiral was changing its distributor too, but this was denied. Crosley is moving a factory regional headquarters from the 9th floor to the McCormack spot opposite the elevators on the fourth floor. California Electric Supply will keep its Crosley display too. Capehart, dropped by Gay Hamilton, may go to Thompson Holmes. Meanwhile Winter Market dates of the Mart were set for Feb. 6-10. Friday noon market day luncheons will again be instituted next year, said George L'Amoreaux. — Mart murmurs

Westinghouse says it will soon bring out a new left-handed iron. — Coming

Lewis Tel-Rad Corp. is a new Los Angeles firm which will produce Lewis Uni-Matic television receivers, priced from around $239.50 to $1,295. Headquarters are at 829 North Highland Ave. — In business

Good sales tie-up of two non-competing manufacturers is being practiced by Westinghouse Electric and Lever Bros. - customer can get a $2 discount on a small home appliance when she buys 2 bars of soap. — Idea

Kitchen Guild of America and Admiral Corp. are conducting a test to find out marketing opportunities of video sets installed in kitchens. — Kitchen TV

Norge has come out with a new line of electric ranges, consisting of six models ranging from a 20-in. apartment range at a suggested price of $164.95 to a 38-in. master deluxe divided-top model to sell for $299.95. — Norge news

Toastswell Co. is selling its two-slice automatic pop-up toaster for $18.95, tax included. Has added to its line an electric bun warmer retailing at $5.95, including tax. — Hot

Westclox started national advertising this month on its latest Bantam electric alarm clock. Designed in ivory finish moulded plastic, measures 3½ in. high. Will retail at $3.95 plus tax. — Alarm

Mercury TV & Radio Corp. has announced the beginning of operations in Los Angeles. Sets are designed by Paul Laszlo and built and assembled in Van Nuys by Pacific Cabinet & Radio Co. — TV mfgr.

Telechron has two special offers for its dealers providing profit margins of 40 and 42% on Telechron electric alarm clocks, and new Tel-Sell display units and cartons for the clocks. — Dealer offer

For its electric clocks General Electric is using a new counter and window display that holds four clocks. Display has two shelves and stands 17 in. from counter to top of the display panels. Openings at the back permit clock cords to be plugged into outlets. Made of lithographed cardboard so it can be quickly replaced. — Counter for clocks

Westinghouse, says its Pacific Coast district manager J. J. Moffatt, is coming out with a new upright vacuum cleaner to sell at around $39.95. Deluxe cleaner was reduced $10, down to $59.95. At the same time price drops from $4 to $12 on 13 electric water heater models were announced. New prices range from $90.95 to $184.95. — New and lower

Nineteen Hundred Corp. president Elisha Gray and Bob Lewis, Pacific Coast district manager, presented the new 1950 Whirlpool line of automatic and wringer-type washers, dryers and ironers at three West Coast meetings last month. In San Francisco H. R. Basford Co. played host at an all-day meeting at the Mart. Sales conferences also in Portland and Los Angeles. — West preview

Gibson will hold a regional convention in San Francisco Oct. 24-25 to unveil its 1950 selling program and preview its line of refrigerators, ranges and freezers. — Advance

After much polling, testing and suggesting NEMA has come up with a new name for "small appliances." Electric housewares they'll be called. (Previously referred to by a variety of names including table, traffic, minor, plug-in appliances). NEMA Section will be changed to Electric Housewares Section too. — More descriptive

Hotpoint has a new garbage disposal that can be installed in 85% of existing homes without major changes in kitchen plumbing, says vice-president F. J. Walters. Disposall is 6 in. shorter than previous models. — Shorter disposal

As part of its 1950 point-of-sale program Emerson has developed a new illuminated store display designed to demonstrate three table model TV sets. — TV decor

A. O. Smith Corp. has expanded its line of electric automatic storage water heaters with the introduction of the Milwaukee line, available in all popular round sizes. — Expands line

John Meck Industries has hiked prices of its small radio line, affecting two models, the DA-601 increased to $11.25 and the DB-602 raised to $12.95. — Upped

Hamilton Beach Co. has a new one-hand three-speed portable food mixer called the Mixette, weighing only 2½ lbs. Sells for $18.25 in the West. — Small one

Rival Mfg. Co. has started shipments on its combination steam and dry iron called Iron-O-Mat, which retails for $14.95 plus tax. Fully automatic and has a one-control operation to balance heat and steam. Weighs only a little over 3 lbs. Has a side filler plug. — Steam and dry

Bendix announces three new Tumble-Action automatic washers with design and style changes to retail from $199.95 to $269.95. One feature-the Dyna-Surge cylinder which, says Bendix, has increased cleansing action as much as 18%. — Improved

Landers, Frary & Clark has its fall program in full swing with a "Universal Value Demonstration Parade" stressing a continuous series of promotions. Is backing it with heavy advertising. . . Company recently announced price reductions on its deluxe two-speed washer and a leader model to retail at $99.95, with pump. Has added two new wringer models to the line, both with pumps, one to sell at $129.95, the other at $119.95. — Underway

APPLIANCE AGONIES

or All God's Chillen Got Troubles

Written and narrated by

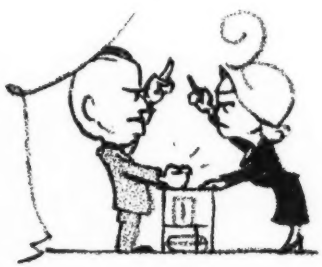
Bob Guertin

Sales promotion manager, Prudential Distributors, Inc., Spokane, and presented with pantomime "blackouts" at the sales conference of Inland Empire Electrical Dealers Assn.

ACT I.—"The Retail Dealer—or Dogged, Damned and Disgusted."

IN presenting the first act of our three act playlet, *Appliance Agonies*, it is only right that we start with the great bulwark of the industry, the retail dealer. You all know what a bulwark is—a stone wall that somebody keeps climbing on one side and which holds back a flood on the other. The poor little retail dealer, who is doing more business than ever before, has troubles, he has problems, in fact, his life is a living hell, as you shall shortly see.

Our first scene opens as Oswald Dimwitty of the Short Circuit Appliance Co. is feverishly working on a hot prospect loaded with coin and sadly in need of a Not-Nice-to-Point range. Mrs. McPrice, who has been shown the range, is enthusiastic, and as we part the curtain Mr. Dimwitty is engaged in that favorite sport of retailers, called by its short name, "haggling." The subject at the moment is the value of Mrs. McPrice's old range as a trade-in.



Mr. Dimwitty is now opening the conversation, showing vividly the deplorable condition of Mrs. McPrice's range. All of ten years old, burners need replacing, oven will need a new thermostat and probably a liner, the porcelain is chipped; in short, he could charge ten dollars for hauling it away, but seeing as how Mrs. McPrice is a good customer, he will give her ten dollars for it.

Oh, oh, look at Mrs. McPrice, who has slaved for hours to keep her old East Shack range in perfect condition. Porcelain chipped? Ridiculous! And it baked perfectly! Besides, Happy Home Appliance Co. has advertised $40 trade-in regardless of condition! So Dimwitty is automatically jacked up to the $40 level with little prospect of saving any more.

But not Mrs. McPrice! Her Scotch has been aroused and, if any old range is worth forty dollars, her East Shack range, in perfect condition, should be worth $80 if it's worth a penny. Dimwitty is clawing for the sky now as the profit flies out of the window. Now they haggle in earnest and finally the climax is reached. Dimwitty is wrung out to $60 and not a penny more.

There, he's said it, the limit is reached, and Mrs. McPrice, after a moment's reflection and the thought that the only other offer had been $35, sadly smiles and says "deliver it."

Dimwitty has now successfully spent two hours demonstrating, 30 minutes haggling, and has achieved title to a decrepit hunk of junk that couldn't be sold for more than $20 under Monroe St. bridge, and still not enough money to pay the office girl!

That's a beginning on trouble. Now let's look further. Later in the day when things are stacking up and good old Dimwitty is busy as a cranberry merchant, Mrs. Lotsamoney waltzes through the door and asks to look at the Clothesmasher Automatic washer and dryer. Mr. Dimwitty has absorbed a lot from distributor sales meetings and is really hep to the pitch.

Carefully he explains the intricate mechanism, spending much time on the special water valve that exposes each single drop of water to a germicidal ultraviolet ray, the rotary blades that automatically pick up the most soiled piece of laundry and rub it vigorously between its rubber ribbed blades to clean completely, the special lint strainer that catches all threads and weaves them back into a small dust cloth, the new soap dispenser that has a vacuum hose that sucks up soap flakes on the floor to prevent waste.

Quickly Dimwitty runs through an entire week's washing that just happened to be handy. Then comes the famous Fluffy dryer and Dimwitty waxes eloquent—not only low wattage but, by pressing one button, all clothes are sprinkled and folded if desired. Finally Dimwitty practically at nervous prostration, finished the complete workout and hopefully turns to Mrs. Lotsamoney, positive he has but to ask to get her quick nod to install both items in her home . . . but does he get

that? Oh no, Mrs. Lotsamoney bought both the washer and dryer last week but she was told Mr. Dimwitty could tell her more things about it than anyone else in town and thanks so much. Now as Mrs. Lotsamoney waltzes back out of the door we bring you a quick look at Mr. Dimwitty watching her depart. (Dimwitty in agony with gun at ear.)

Now one would think that by this time friend Dimwitty would surely have thrown in the towel and gone back to selling life insurance and wiring hen houses on week ends, but not our friend. He has battled his way for years to establish this business and come hell or high water he'll stick it out. Then comes in another lovely shopper; a faint gleam comes into his eyes and they start talking.

She points at the range and asks how much? Dimwitty responds quickly with the price. Then she points at the dishwasher, resplendent in its white cabinet. How much? Dimwitty pops out real quick, with his heart in his mouth and slightly giddy at the thought of both a range and dishwasher, but that's not all . . . this lovely lady smiles at the Freeze-tite refrigerator and again Dimwitty smiles like a cat in a creamery and volunteers the price . . . "Madam," he asks, "would you like to buy these items on our liberal credit terms or do you want to pay cash?" "Oh no," she replies sweetly, "I have a friend who can get it for me wholesale and I just wanted to see how much I was saving!"

Three alka seltzers and two aspirins later we still find old Dimwitty sweating it out and hoping for the best. He's right, the best is yet to come. You know, all of the dealer's troubles don't come in the front door. Oh no, years ago Don Ameche or Alexander Bell (don't remember which) invented a little gadget that was purposely designed to ring its bell to distract in the middle of a sale, to give the wholesaler a way to call and ask for an order without driving out, and for one more purpose that has added many a grey hair to the silvery thatch that is beginning to appear on Dimwitty's second story. Yes, this other great purpose of a telephone is for that favorite customer to call when something happens.

Now the phone is ringing, and Dimwitty, with apprehension, picks up the vile thing and mumbles "hello." Ah, it's Mrs. Griper: "Please, Mr. Dimwitty, when can I have my toaster back. Why, you've had it for months! If it isn't ready soon I want my money back!" After many excuses, the phone is returned to its resting place, only to jangle again.

This time it's the lady next door explaining that her coffeematic, which you say has been in the repair station for three months just waiting for a little bitty element, simply has to be returned today. She has a big party tonight and couldn't you at least let her use a new one to make coffee. One time won't hurt it and after all she did buy it from you. What is Dimwitty to do? She might buy that ironer some day and he has to take care of her, so there goes the coffeematic.

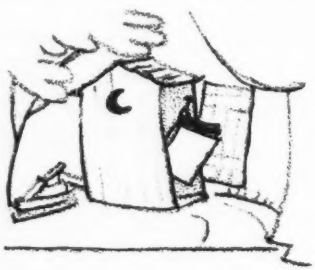
Next the phone brings a very irate lady who just caught her skirt in the door of her refrigerator and it was practically torn from her back. Dimwitty is thinking he would have liked to be there—she does have a nice back—but no, she wants a new dress. Then

follows a lengthy explanation that the manufacturer spent thousands of dollars perfecting a refrigerator door that would seal tightly and would she please and yackety yak for twenty minutes, but she hangs up mad.

Dimwitty is now ready to go home. He puts on his hat and coat because he must be on time as his wife has company coming and lord help him if he's late . . . the darn phone rings again . . .

Mr. Lottanerve himself states that his home freezer isn't working. His food is spoiling, and, if Dimwitty isn't over at his house in ten minutes, some life insurance company will have to pay on his policy. Tired, beat and forlorn, Dimwitty grabs his tools . . . no time to change from his best suit to overalls . . . and is on his way. For ten cents, he'd throw the damn phone out.

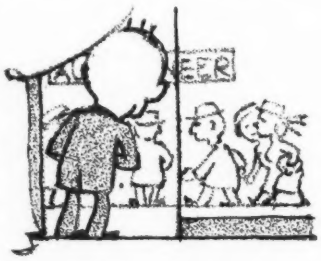
The ordinary mortal would throw in the sponge by this time but there are other things, even worse things, that make Dimwitty's life a living horror. Everywhere you go, you will always find that the best selling efforts on the retail floor, the finest in merchandise, and the most beautiful display are not enough. There's always something that beats the poor dealer out of a sale. In the United States there is one great factor in every town and hamlet that steals the sales with monotonous regularity. We bring you



now an insight into this great merchandising medium that has invaded in particular the rural area. The great lands to our south and west are inhabited by a type of character that in recent years has been able to afford gold-plated combines. I speak of the farmer. But when Dimwitty approaches this market, he finds this great medium I spoke of already there, already selling, and always uppermost in the farmer's mind.

Last but not least in our parade of dealer difficulties comes a shocking state of affairs that has had him wearing ear muffs recently. Dimwitty has just finished putting all new fair trade price tags on his gorgeous appliances, has shined them all up, has hired a new service man to really take care of the customer, has arranged for a home and store demonstrator to give his customers the real story behind his products and, in general, has spent vast sums preparing himself to be a real help to the prospective buyer. In return he is quietly anticipating a fair return on the large inventory he has put in. As our scene opens, Dimwitty is standing complacently contemplating his operation, momentarily expecting hordes of people.

He looks out the window and is amazed! People in droves are coming towards his store. My oh my, what a marvelous crowd, here are sales galore



on their way. But wait, the crowds go by his beautiful and expensive window, across the street, and suddenly comes that familiar cry of the auctioneer.

Needless to say, Dimwitty is hopelessly crushed. And with that final blow, let's leave our poor beat up retailer and go on to Act Two of *Appliance Agonies*: one step closer to the raw metal, and call on the middleman, the wholesaler of electric appliances!

ACT II.—"Wholesaler Slaughter"

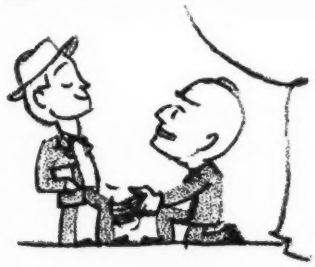
You know there are three different views of the wholesaler. First, the dealer is convinced that, if anyone ever sat on his posterior and collected a nice fee off of a retailer's tiresome efforts, it is the wholesaler.

On the other hand, the manufacturer sits 3,000 miles away behind a Philippine mahogany desk and growls that the darn wholesaler must be dead asleep because he isn't putting all of his time promoting his particular product.

Then there is the wholesaler, plagued with a million expenses, buying items and selling them for a few cents more and giving 5% commission on each sale, spending three to ten dollars on service, trying to recapture $5,000 in obsolete parts, staying up nights trying to figure out sales programs, and finally taking $30 loss trying to dump. Here, too, we find individuals destined for a short and difficult life as we shall shortly see . . .

First let us take a quick flash back, just one year ago today. Homer Supo, the distributor salesman, walks into his dealer's store in May of 1948 with his small allocation of ranges and refrigerators tucked in his pocket and his long list of dogs to sell reposing in his other pocket. The dealer rushes out with a small whisk broom and cleans his clothes, smiles sweetly, in-

quires about his lovely wife and his swell boss. In short this is what a typical call of Homer's used to look like.



Yes, yes, so true, old Homer has the whip hand and Dimwitty is begging, pleading, cajoling—he'll buy the dogs, he'll run the ads, just let him have some major appliances.

Well, now to the current times. The worm has done countless revolutions and Dimwitty is wearing a different outlook. Homer walks in the door with a long list in both pockets. This time there isn't a string connecting the two. What do we find, —

If you think Dimwitty is going to even order one hot plate, you have holes in your head. He's loaded and looking only for customers, not for salesmen. Without any assistance. Dimwitty has perfected the art of looking as if each salesman is boring him to death. Sometimes the salesman, poor Homer, wishes he actually was.

So now the shoe is on the other foot, and we find other problems rearing their ugly heads. Homer has just emerged from a terrific distributor's sales meeting and is oozing pep and vinegar from every pore. He strides up to his favorite dealer's appliance emporium all set to spend a half or three quarters of an hour running off at the mouth extolling all the fine selling features he has just heard about and get Dimwitty to order a whole raft of them. Our scene opens as Homer strides up with outstretched hand . . .

Dimwitty doesn't even see the hand, doesn't even say "hello," he has things on his mind . . . Where is that order he gave Homer last week; he still hasn't received a replacement burner for that last apartment range; the kitchen cabinets were the wrong size; his home freezer is over priced and won't run anyway; who does he think he is opening up Joe Doaks fourteen blocks away; why didn't Homer cancel that toaster order when he told him, now he has them running out of his ears and wants to send them back; when is somebody going out on the automatic washer that won't work; and he could, and he does, go on for a good thirty minutes distracting poor Homer, bull dozing him, griping, complaining (bitching is the word) and filling Homer's little sales book up with a long list of parts, service calls and troubles.

Finally Dimwitty takes a breath and Homer searches through his distracted mind for the remaining shreds of the terrific sales talk with which he was going to impress Dimwitty and actually make him a retired millionaire. Can he remember anything? "Oh, yes Dimwitty, we have a new model of" . . . but he is cut short! I don't need any! So Homer trudges out . . . and you think a distributor salesman's life is a happy lot?

Homer necessarily has to be the type of individual that doesn't give up easy. Sure, the last try at old Dimwitty resulted in nothing but service gripes and all kinds of trouble. This time when he goes out he has a promotional package. What wonderful words are the words "package" and "deal"; they simply ooze with sales and surefire traffic builders. So Homer tucks his little satchel under his arm, picks up his small thirty-five pound brief case, his armload of samples, and staggers into Dimwitty's.

Here, old pal, is the real thing, a promotional package for the June Bride! You simply can't miss on this one. First the big banner, then the counter display cards, the hand out folders, and look at this, with this lovely Mix-a-blend, you can give away six bunches of carrots for juicing, a pint of Old Boston for gin fizzes, three lemons, a quart of ice cream, $20 in merchandise credit and three season passes to the Post theater, and the baseball games and two free tickets on the Irish lottery.

He holds up the beautiful item and sighs with the contentment of a presentation well done. High on his pinnacle of confidence he looks down at Dimwitty for corresponding nods of encouragement. Does he get any?

Oh no. Dimwitty grunts that it won't sell, there's no market for it, he doesn't like the blender, he can't sell them, people wouldn't buy them if you gave them away, he's had them in stock for months, and would Homer please get the hell out and stop bothering him!

Then another problem has presented itself in drastic proportions. A couple of years ago when Homer went into Dimwitty's, it was to bring the important news that the 123 model of Bossley Cupboard Door refrigerator was going up. What did Dimwitty do?

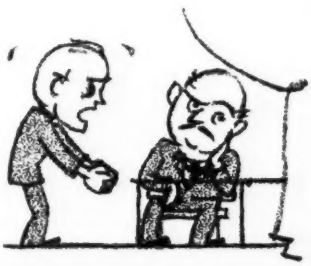
Dimwitty pleaded and begged to buy just three more at the old price so he could take advantage of the rise in price and make a little more money. Homer was won over and took his order with the sage advice that what goes up must come down.

But now time has passed and the seller's market too. Now when Homer has come in to announce that the old 123 model of Bossley Cupboard Door refrigerator has dropped $20, what happens?

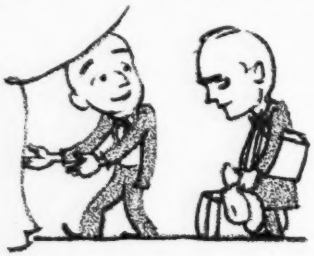
Dimwitty drags out the trusty baseball bat and screams that he doesn't give a darn if he did buy his floor sample ten months ago . . . he wants price protection! Homer can't remind him of the days gone by. Oh no, he wants to sell another 123 reefer, so what can Homer do?

Go back to the office and plead for his prize customer, please break the policy even if it breaks the company (and it finally will) and take care of poor old Dimwitty . . . I'm sure he's going to buy a half a hundred of them if we take care of him . . . but of course he never does.

Next on the thorny path of poor Homer as he makes his call regular as a clock to old Dimwitty, is another very serious problem that really puts



a damper on his sales efforts. Still lugging the now familiar deadweight of a catalog he opens the door to find



Dimwitty in a very agreeable mood for a change.

Dimwitty has his hand out and is all smiles. He starts to pass the time of day and even thinks of four or five things that he wants to order. But Homer stands lifeless as a jellyfish and doesn't respond, merely shakes his head. Dimwitty launches into a vivid description of the real sales job he just did on Homer's range and how he can sell many more, but Homer hasn't any interest. Dimwitty is puzzled at the apathy of Homer and finally our poor hero screws up enough courage to remind Dimwitty weakly that his account is 60 days overdue and can he please have a check for $800, and he can't ship on open account any more. Wotta life!

Homer has another snag that is always reappearing despite the most vigilant watchfulness he can exert or the most convincing tearing down of other merchandise he can do. This particular day the sun is shining, and he is looking forward to a pleasant hour with old Brother Dimwitty shooting the breeze, so to speak, and probably picking up a nice little order, enough for the new coat the wife has been wanting. With a whistle on his lips he goes in to see his dear, old pal for whom he has done so much.

This time Dimwitty is the unresponsive individual. Finally Homer can stand the suspense no longer. "What is the matter old pal? Some service trouble bothering you? Don't worry. I can take care of it." No that is not the trouble. With tears in his eyes, good old faithful Dimwitty, after taking the cream of the allocated merchandise last year, and all of the other favors, lets poor old Homer in on the big news. He has taken on General Electric or Hotpoint, he doesn't remember which, but he is not going to handle Homer's line any longer.

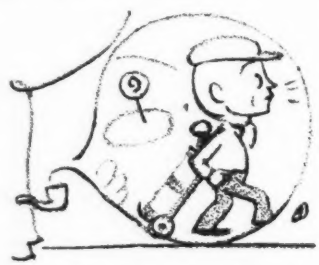
ACT III.—"Salesmen All"

Now, let us proceed with the third and final act of our epic *Appliance Agonies* and present our interpretation of that famous cartoon: "How the Salesman Looks." Our first view is that very definite impression the little wife has of hubby's arduous and tiresome duties that keep him at work so

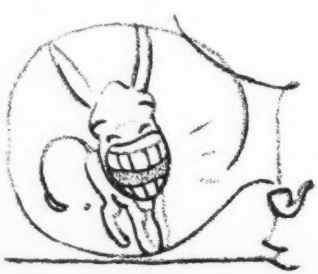
many nights of the week. Her conception of his activity looks like this:

You would be surprised how many erroneous ideas these wives get.

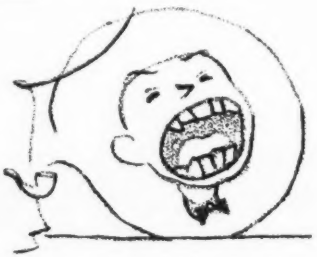
The next individual that is constantly thinking of the poor salesman is the Boss. As he sits in his swivel chair, he is mentally following his salesman out over the territory and imagining where he is spending the company's time. His conception of our hero's activity looks like this:



There are still other people thinking about our poor hero as he trudges around the country peddling appliances—including his brother peddler—in the truest sense of the word, his competitor. Love is not lost nor compliments either, and as the competitor walks in the door of Dimwitty's store to find our hero just one jump ahead of him, his conception of our hero looks like this:



Then, of course, as long as we have mentioned Dimwitty, we might take a look at his viewpoint of our salesman. There seems to be one predominant characteristic of selling that sticks out even more on our hero. This is a muscular action caused by elevating and lowering the lower jaw in a rapid, unending, monotonous fashion like this.



Never does poor Dimwitty have a chance to say a word. Our hero to him is just plain all mouth. Last but by no means least we should give our hero a chance to show what the truth of the matter really is. In all cases, in all quotas, in all detail and follow through, in all dirty jobs, in all service calls, what is it our poor hero is certain of? Right again, he is always carrying the load.

SCREA

"Television in Action" will be the theme of a National Television-Radio Exposition scheduled for Los Angeles' Shrine Convention Hall, Oct. 15 to 23, by the Southern California Radio and Electrical Appliance Assn.

Willard F. Hellman, the association's president, declares this "will be the greatest public exhibition of television equipment ever to be presented in the United States."

The exposition plans to exhibit a larger variety of makes and sizes in television receivers than was shown at the New York show last year.

IEA

Intermountain Electrical Assn. has scheduled its annual conference for Oct. 7 at the Ben Lomond Hotel, Ogden, Utah. Conference chairman is Paul DeVine.

IEA's various chapters have been busy with home freezer schools. Salt Lake, Price and Provo chapters recently completed freezer classes and demonstrations in their territories. Ogden Chapter has concluded a successful home freezer school, with dealers displaying freezers, newspaper and radio ads supporting the promotion. Logan Chapter is planning a similar freezer school.

will the Public Revolt *against* FLUORESCENT LIGHTING?

Will Sub-Standard Quality and Sub-Standard Performance Bring Fluorescent Lighting into Public Disfavor?

SINCE fluorescent lighting equipment was first made available ten years ago, the standards of fluorescent lighting and of fluorescent lighting equipment have been continuously IMPROVED. As a result, fluorescent lighting has quickly achieved national acceptance. This public confidence has been earned by the Lighting Industry because the great majority of the equipment produced and sold to the public has met with the high standards required to provide satisfactory performance.

TODAY the public confidence is being placed in jeopardy by the increasing occurrence of fluorescent industrial units which, instead of being built up to required standards, are being built down to a price.

How long will it take the public to wake up to unsubstantiated claims?

The public cannot be expected to understand all of the technical factors which differentiate a sub-standard unit from a unit built to deliver sustained trouble-free economical performance.

Informed electrical and lighting men know the importance of high quality starters and lampholders, in terms of easy maintenance, reliable starting and reliable operation.

They know that poor electrical and mechanical design can cause high temperature operations of the ballast resulting in decreased ballast life.

They know, also, that lamp life is shortened by a ballast which supplies low starting current or by one that delivers low operating watts to the lamp. They know that low power factor ballasts do not permit efficient utilization of present wiring. They know that well designed and well constructed lighting units, such as those made to RLM Standards, will stand up and give full satisfaction to the customer.

The Remedy

It is up to the entire Lighting Industry to put this knowledge to work for the benefit of the public. This can best be done by first furnishing customers with the facts about initial cost, maintenance cost and performance of fluorescent lighting equipment and by supplying equipment which is warranted by the manufacturer and certified by an independent testing agency as meeting recognized and published standards of design, construction and performance.

This Advertisement is published in the Interest of the Entire Fluorescent Lighting Industry by

RLM STANDARDS INSTITUTE
INCORPORATED

The letters RLM stand for Reflector and Lighting Equipment Manufacturers

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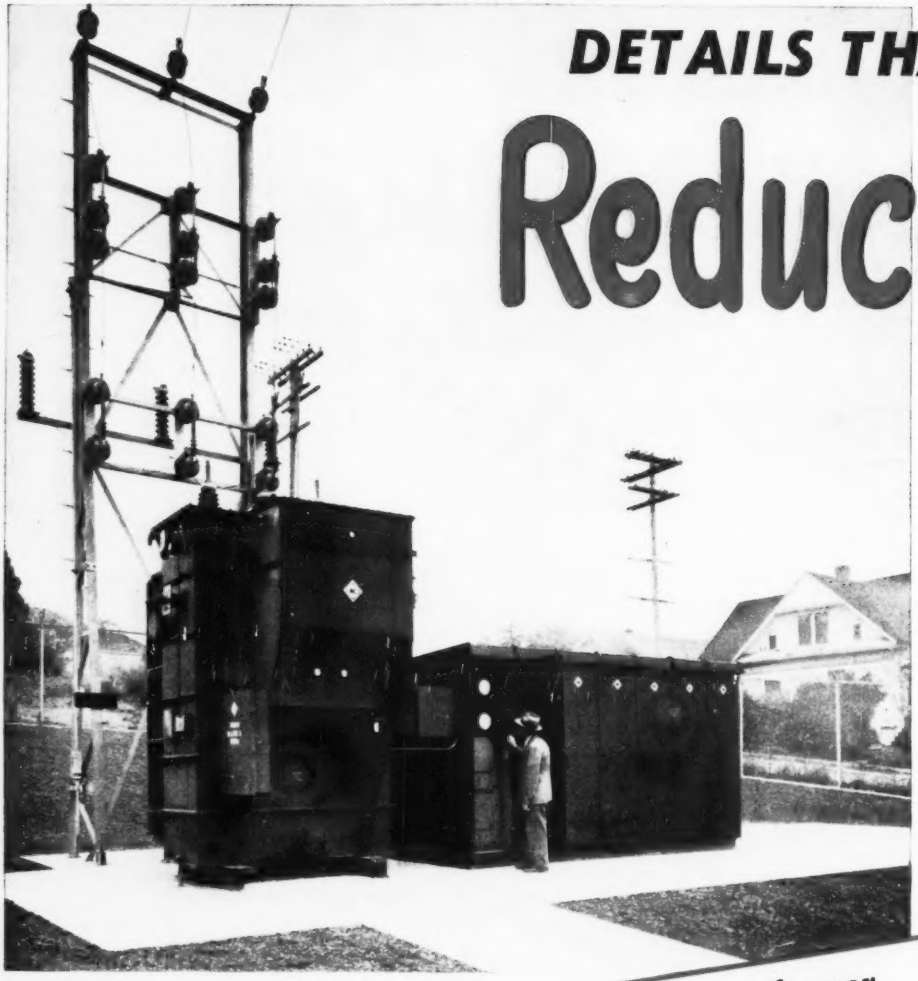
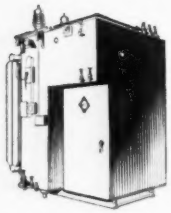
DETAILS THAT Reduce





SCS SINGLE CIRCUIT unit substations consist of a transformer, secondary breaker and control, *Oil-Sealed* inert gas system for protecting oil, and the 32-5/8% step-type regulating mechanism for 10% range of regulation — all combined within a single housing. They are installed as a unit.

✓Oil-Sealed Inert Gas Transformer

To all the protective advantages of the inert-gas-over-transformer-oil principle . . . the Oil-Sealed system gives the added advantages of operating pressures usually less than one pound! Stress and pressures are reduced on gaskets, on terminal board, on the entire transformer structure.

And inspection is made easier too. One look at the oil level gauge in the conservator and the entire inspection is complete! Gauges are conveniently located on the side of the transformer . . . easy to see . . . easy to read. The Oil-Sealed inert gas system is always in balance. Continual recharging is not required. There are no valves to adjust. No gas is wasted. There are no external bottles to replenish. Inspection is simplified, maintenance reduced.

A-2814

SPEED-UP INSPECTION . . .

Maintenance

IN ALLIS-CHALMERS UNIT SUBS

TRANSFORMER—TAP CHANGING MECHANISM — SWITCHGEAR . . . every part of an Allis-Chalmers Unit Substation is built with added attention to details of construction and arrangement that result in quicker inspection—reduced maintenance.

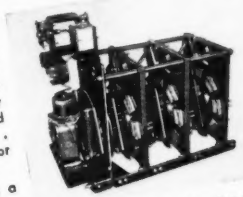
Details like potential and control power transformers that are *drawout mounted* . . . finger-type disconnects located *on the breakers* . . . and A-C's "quick break" contact separation that lengthens contact life are good points to compare when considering unit substations for your distribution system.

Another benefit is undivided responsibility for performance of the complete substation. And less paper work, quicker installation mean added economy. For the full story on what Allis-Chalmers Unit Substations and planning can mean in your distribution system, call your nearby A-C representative. Or, if you prefer, write direct.

ALLIS-CHALMERS, 939A SO. 70 ST.
MILWAUKEE, WIS.

✓Original 5/8% Step Regulation

Allis-Chalmers pioneered the 5/8% step type "quick-break" regulation to give you the simplest, most dependable tap changing mechanism on the market! This ruggedly built unit is entirely immersed in oil for maximum life . . . to eliminate the need for periodic maintenance.



It holds fluctuations to a narrow band . . . low as ± 1%! Variations are averaged by a voltage integrator which controls the tap changing mechanism. Feather touch control panel is conveniently located in a weatherproof cabinet on front of transformer at shoulder level.

Fast — reliable — close regulation improves customer satisfaction — increases revenue.

✓Accessible Switchgear

Designed for ready inspection and simplified maintenance, switchgear compartments are accessible through full length hinged doors both front and rear. Relays, potential and control power transformers are drawout mounted. Circuit breakers are of the horizontal arc interruption type with finger-type disconnects mounted on the removable breaker element. Vertical lift design means breaker disconnects that are visible . . . assures safe inspection because the breaker and accessories can be operated through actual control circuits with positive assurance that breaker primary contacts are not engaged.

This greater accessibility and safety results in quicker inspection . . . lower maintenance through better care.

A-C ALLIS-CHALMERS

Feather-Touch and *Oil-Sealed* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

"Originators of 5/8% Step Regulators!"

THE MONTH IN BRIEF

Snohomish PUD Takes Puget Properties

Snohomish County PUD, Everett, Wash., took over properties of Puget Sound Power & Light Co. within the county on Sept. 1. The transfer was made under an agreement last June that the company would sell to the PUD if over-all acquisition of the properties by a group of PUDs could not be completed by Oct. 31. Purchase price was approximately $16,500,000, plus accounts receivable. The district financed the purchase by sale of a $19,500,000 bond issue at effective interest rate of 3.28%. The PUD now takes all its power from Bonneville, but is studying feasibility of a hydro project on the Sultan River. (See page 114.) Statement in Washington, D. C., by Rep. Ben Jensen of Iowa that Puget Power sold its Snohomish County properties at greatly inflated values was denied by President Frank McLaughlin. A. H. Murray, PUD manager, denied Jensen's charge that the $130,000 commission to Guy C. Myers as fiscal agent was out of line. Myers actually received $38,000 of the total and would get the remainder over the life of the bonds, he said. A. S. J. Steele, district manager for Puget Power, continues as PUD general superintendent. Murray is in charge of all PUD operations, including a water system. The district is required to keep company employees for at least two years. Former company employees in the county on pensions will be continued on the company pay roll.

Tax on Federal Generators At Issue

A county's right to tax users of federal power generated within its boundaries, regardless of state and federal agreements, is at issue in a case before the U. S. District Court in Nevada. Clark County (in which Hoover Dam generating facilities are located) wants to collect $225,435 from the city of Los Angeles as a tax on power from Hoover generators—a tax authorized by a county ordinance passed in 1948. The state of Nevada has asked dismissal of the suit, basing its case on the Boulder Canyon Project Adjustment Act. This federal statute guarantees the state $300,000 annually from 1939 through 1987 and provides that any other taxes levied by the state or its subdivisions on the facilities shall be subtracted from that amount. If Clark County should win its suit against Los Angeles, annual payment by the federal government to Nevada under the existing contract would be reduced hereafter to approximately $74,565.

Surveys Start on Westside Line

Following Senate approval of a $2,000,000 appropriation, a USBR field party last month started surveys of westside transmission lines for California's Central Valley project. A survey office has been opened in Red Bluff under supervision of Construction Engineer H. W. Thomson. Already under construction is a 230-kv. circuit down the east side of the valley from Shasta Dam to the Tracy pumping plant, completed as far as Oroville. The other two lines will go 220 miles down the west side to Tracy. Regional offices of the bureau and the Corps of Engineers were playing a waiting game following President Truman's endorsement of bureau plans for California water development. However, protests came from Charles Kaupke, watermaster of the Kings River Valley Water Users Assn., who declared the President's action was a surrender of irrigator's rights. The association has favored construction and operation of water development projects by the Engineers, mainly because of the absence of renewability clauses in bureau water contracts.

Town Renews WWP Contract

Although the price is somewhat higher, Chewelah, Wash., city council has decided to renew its power contract with Washington Water Power Co., rather than take power from Bonneville. Commenting on the five-year contract renewal, Mayor A. W. Birge said that "the fact that Chewelah would lose the right to administer its own light department, and still be unable to lower rates for some six to eight years, was discouraging so far as accepting Bonneville power was concerned." Even though the city would save money on the actual purchase of power, it would be necessary to levy other taxes to support the departments now being subsidized by the light department, he added.

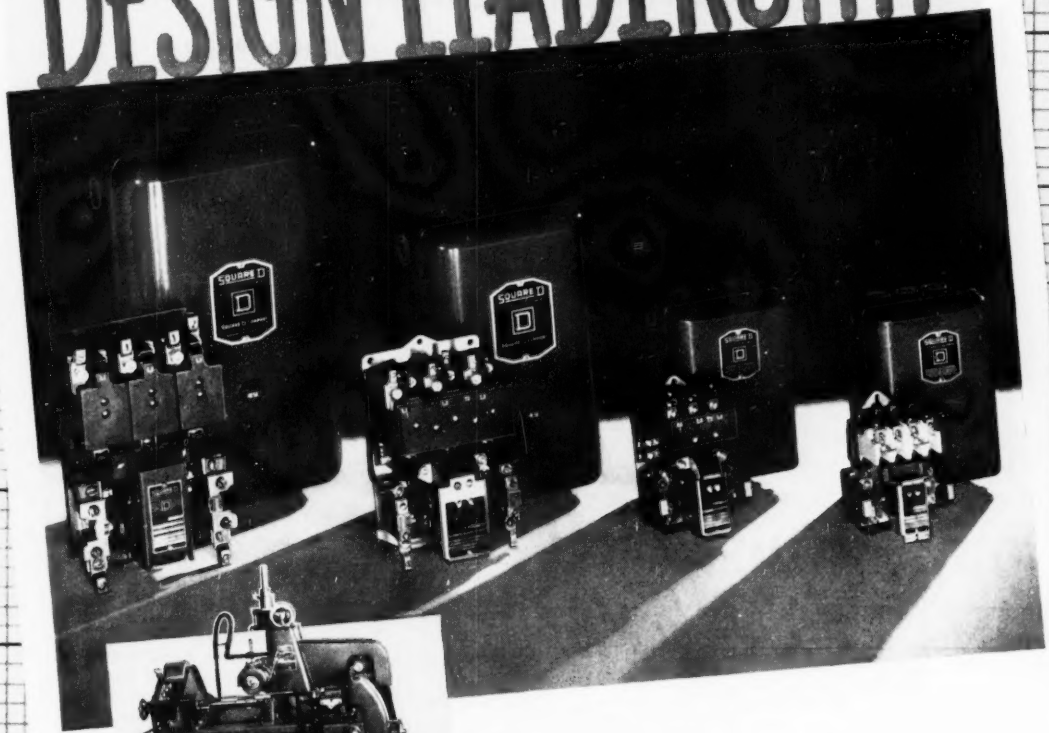
Price Comments on Business in West

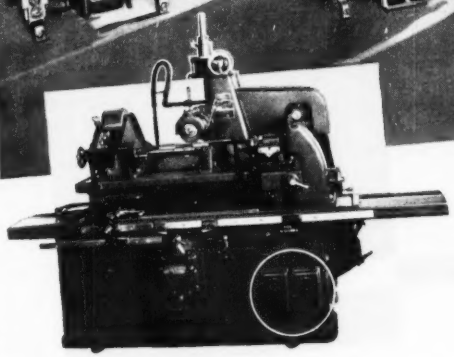
Gwilym A. Price, Westinghouse president, visiting the Far West for the first time last month, found much on which to comment favorably. Some of his observations: Business in the West and Southwest is better than elsewhere in the U. S. Low point in business was reached in mid-June; since then the trend has been definitely upward. Excepting appliances and heavy equipment, Westinghouse now manufactures 50% of Western electrical goods requirements in the West. Business in 1949 will approximate 1948 in total volume; if the auto industry meets its challenge in the next few months, all business can look forward to bright prospects for five to ten years. Westinghouse now has 4,100 employees in the West with an annual pay roll of $15½ million.

Closed Shop Challenged

Action which may have far reaching effect on all closed shop contracts between electrical contractors and electrical workers unions has been started in Los Angeles by Mrs. Edwin Selvin, militant leader of Women of the Pacific. She has instituted proceedings to invalidate the continuing agreement between the Los Angeles Chapter, National Electrical Contractors Assn., and Local B-11, International Brotherhood of Electrical Workers in Los Angeles, as being in violation of the Taft-Hartley Act provisions forbidding a closed shop. Before this case is settled, another question may be settled—whether the construction industry comes under the National Labor Relations Board. A year ago similar action on Mrs. Selvin's part caused negotiations to be dropped between Local B-11 of IBEW and an independent association of electrical contractors. NECA already had a contract, predating the Taft-Hartley law, which was being continued in force without termination, as many such contracts are throughout the West. Decision in this case may affect all such existing agreements.

DESIGN LEADERSHIP





SQUARE D MOTOR STARTERS

SQUARE D's DESIGN LEADERSHIP is reflected in important features: Generous wiring space . . . simple contact change . . . easy coil removal . . . additional electrical interlocks . . . long life . . . NEMA standardization . . . simplified maintenance. These are features which add up to an ever-increasing preference for Square D motor starters.

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Square D Company, 4335 Valley Blvd., Los Angeles 32, California

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corrals wayward footcandles ...saves steps for eyes!

It beams 80% of the footcandles directly down on the working area...directs 20% upward for eye-easy brightness ratios.

Its dust-discouraging design and hinged eggcrate louvres make it one of the easiest of all fluorescents to keep clean and efficient. Versatile, too...you can mount the Futurliter in units or rows, surface or suspended.

"Eye-to-the-Future" Futurliters give a lighting system flexible footcandle capacity. Up to 45% more light can be had by adding a third lamp to two-lite units.

You'll find detailed data in our handy new Pocket Catalog 46A-C...yours with the compliments of

Guth LIGHTING

YOUR TEAMMATE IN precision-planned LIGHTING

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THIS MONTH'S NEWS

PUD Hydro Project Declared Impractical

Construction by Snohomish County PUD of a hydroelectric project on the Sultan River in northwest Washington would be impractical, according to the Seattle firm of R. W. Beck & Associates, utility analysts and engineers. Studies for the $13,870,000 project are being made by Harza Engineering Co. of Chicago, and the PUD has indicated that it will not make a decision until their completion sometime next year.

Beck concludes that, since the city of Everett has prior rights to the diversion of 380 sec.-ft. from the river (although it now diverts only 155 sec.-ft.), the project's 51,800 kw. of peaking capacity could produce only enough energy to operate at something between 33⅓ and 30% annual load factor, based on total energy producing capacity of 145,600,000 kwh. annually. On this basis the power would cost 6.1 mills per kwh. Unregulated stream flow during the minimum month has gone as low as 43 sec.-ft. and will fall below 380 sec.-ft. better than 40% of the time, Beck declared.

Full weight was given in the report to the fact that the PUD has a long-term firm power contract with Bonneville at a cost averaging less than 2.9 mills per kwh.

City, District Agree on Property Distribution

City of Ellensburg, Wash., and the Kittitas County PUD, Ellensburg, have agreed on division of Puget Sound Power & Light Co. properties in the county, in event of purchase by a group of PUDs. Value of the Kittitas County properties, including the PUD's share of a pool purchase of generating properties, has been estimated at $1,800,000. Division of the amount between city and district will be determined by engineering survey. The city will take distribution facilities in the city and immediately adjacent; the PUD will take other county facilities.

● Pacific Power & Light Co. has leased 70,000 sq. ft. of space at the Walla Walla, Wash., airport for general stores supply. The space includes 20,000 sq. ft. of outside storage space for transformers.

ECONOMICAL, ACCURATE MEASUREMENT OF SMALL DEMANDS

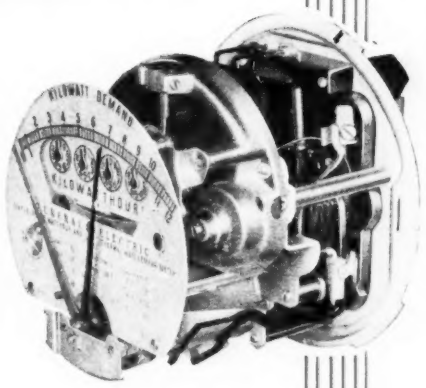
thermally..

G-E WATTHOUR THERMAL DEMAND METER, TYPE IHM

Reliability and lower maintenance costs are assured with this meter because the thermal element operates on the "direct-heat" principle. This produces a greater torque which permits the use of larger, sturdier parts. The direct-heat element also eliminates heat transfer. As a result, the meter will not overshoot on transient loads, response time can be easily predicted, and shorter testing time is possible.

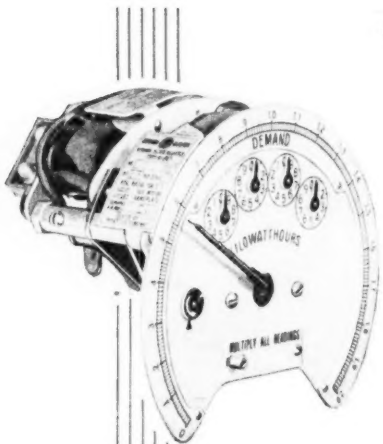
Sustained accuracy at high and low loads is assured by the wide-limit watthour-meter element. It also has braking magnets die-cast in the frame for added stability, and a relief gap that provides a controlled breakdown point.

This meter will save you installation costs because, though it is essentially two meters in one case, it fits standard watthour-meter installations. Complete details are available in Bulletin GEC-408.



mechanically..

G-E INDICATING DEMAND REGISTER, TYPE M-30



Your maintenance costs will be low with this register. A novel application of the Geneva mechanism resets the pointer-pusher by direct-drive gearing, thereby eliminating the need for the spring and latch mechanism found in conventional demand registers. Interval resetting is accomplished with precision and freedom from shock.

Liberal spacing of plates, shafts, and gears gives maximum visibility for inspection. Very substantial plates, plus parallel arrangement of shafts, insure perfect alignment of parts and stability of bearings with minimum adjustments. And, the fewer number of parts assures lower maintenance costs.

This register is available to replace the standard kilowatthour registers on a large variety of a-c watthour meters. Your nearest G-E representative will be glad to discuss your particular application, and fill your order. Call him today.

More details are available in Bulletin GEC-413. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

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With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, Richland, and Sales Offices in twenty Western cities.

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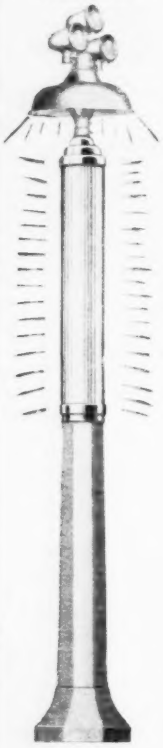
UTILITY MEN

THE FAMOUS PYLON-LITE



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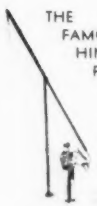

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CALIFORNIA OREGON POWER EXPANSION UNDERWAY

California Oregon Power Co. has completed and energized a transmission line from its new generating station at Toketee Falls on the North Umpqua River in Oregon to its substation at Dixonville, six miles east of Roseburg.

Construction of the 49-mile line, involved erection of 305 towers and 659 poles, and stringing of 616,000 lb. of 19-strand copper conductor. About 9,000,000 ft. of timber were cut for the right-of-way.

Company plans call for ultimate extension of transmission lines to Josephine, Jackson and Klamath counties in Oregon. The entire project, designed to meet power needs in southern and southeastern Oregon, will represent an investment of around $4,000,000.

Additional transformer installations in Douglas County, now under way, total a capacity of 33,000 kw.

Idaho Power Begins Oregon Terminal Substation

Idaho Power Co. has started construction of a $900,000 terminal substation at Ontario, Ore., and a $600,000 transmission line between Huntington and Baker, Ore.

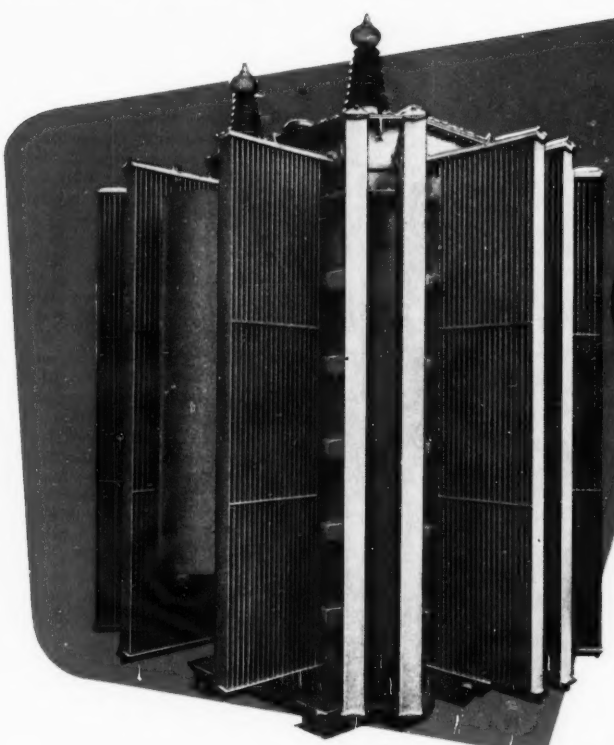
The substation will be energized in November with eight major transmission lines—four of 138 kv. and four of 69 kv.

Purpose of the terminal is to fill in a loop of lines from the Upper Salmon Falls plant in Hagerman Valley by way of Boise and Caldwell, Idaho. Construction of a line to Baker should be completed around Dec. 1, company officials announced.

Modernization Planned for Seattle's Diablo Plant

Modernization costing an estimated $400,000 is planned for Seattle's Diablo hydroelectric dam on the Skagit River. Superintendent E. R. Hoffman has asked the city council for authority to spend that amount for paving spillways, overhauling steel gates and performing other work.

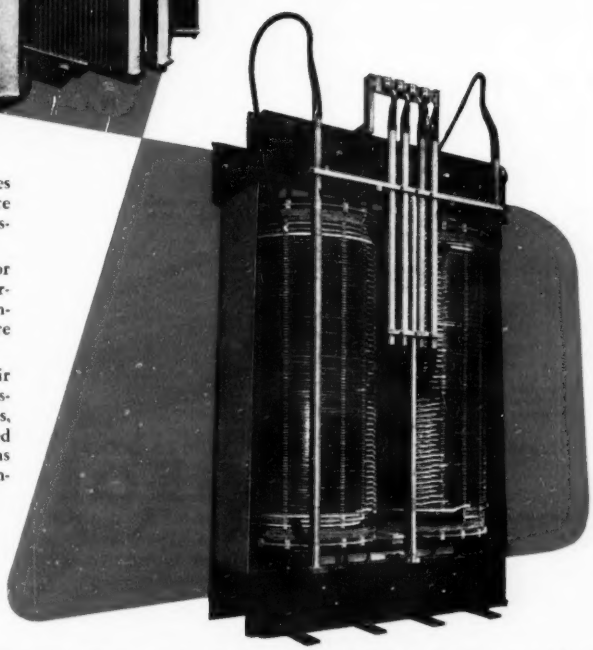
City Light expects to have its Gorge power house back in operation, after a closure during the summer to permit tunnel repairs and construction preliminary to addition of a new generator. The new generator will not be ready for service until late in 1951, but the existing units will be operating again this fall.



Wagner Transformers on the job . . .

16,667 kva power transformer

Single Phase, 60 Cycle
72,000 to 6,600 volts



Wagner, with a background of almost six decades of transformer manufacturing, has the experience and facilities to make the building of power transformers part of the day's work.

Wagner Power Transformers are known for their *proven* dependability because they are liberally designed with extra factors of safety, constructed of carefully selected materials, and are expertly engineered, built, and tested.

Users of power transformers will find it to their interest to consult Wagner on their next transformer installation. Twenty-nine branch offices, located in principal cities and manned by trained field engineers, are ready to serve you. Bulletins TU-180 and TU-181 give information on the complete line of Wagner Transformers.

Wagner Electric Corporation
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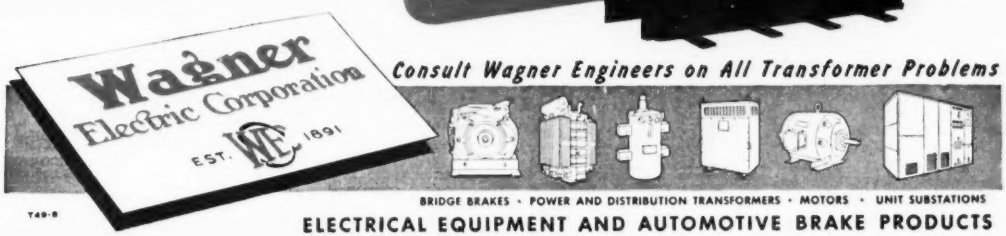

Consult Wagner Engineers on All Transformer Problems

BRIDGE BRAKES • POWER AND DISTRIBUTION TRANSFORMERS • MOTORS • UNIT SUBSTATIONS

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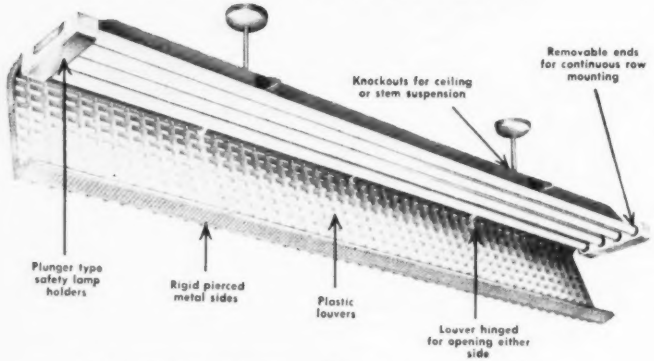
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Plunger type safety lamp holders
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Louver hinged for opening either side

This outstanding luminaire utilizes the brand new high output 75 watt, 430 m.a. T-12-96" fluorescent lamp. It is scientifically engineered to produce the utmost in lighting quality and efficiency. "Wonderful — I've never seen such a beautiful unit!" says a leading illuminating engineer.

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Offices in Principal Western Cities—Branch and Warehouse in San Francisco

POWER NOW GOING TO DETROIT DAM SITE ON NORTH SANTIAM

With completion of the last link in the Bonneville Power Administration's Albany-Detroit transmission line in Oregon, power began to flow to the site of Detroit Dam, under construction on the North Santiam River.

Contracts for transmission of the power have been negotiated between the Benton-Lincoln cooperative, the Corps of Engineers, and Consolidated Builders, contractors for construction of the dam.

Initial delivery of power is only 700 kw., but this will be increased to 2,500 kw. in December and probably to 4,000 kw. next year.

Another new Oregon power link, just completed, provides additional power to the Portland area. It is a 13-mile, 57-kv. transmission line from Bonneville's Troutdale station to Portland General Electric Co.'s Lents substation in East Portland. The line provides the seventh electrical tie between the PGE system and the Bonneville power grid.

B. C. Power Commission Buys Three Electrical Systems

Purchase of three small electrical systems, including two on Vancouver Island, by the B. C. Power Commission has now been approved by the British Columbia government.

They are: (1) Lake Cowichan Electric Co. Ltd. for $68,000. The firm has been distributing power purchased from the Hillcrest Lumber Co. in the Lake Cowichan area. (2) The municipally owned distribution system at Ladysmith at a cost of $70,000. At the same time the government approved a $20,000 rehabilitation program for the system. (3) The electric distribution system of the Kitanmax Water and Power Co. at Hazelton.

● Pacific Power & Light Co. has acquired the Athena Light & Power Co. in eastern Oregon, adding about 300 customers by the transfer. Power for the Athena system had been supplied at wholesale by PP&L before the transfer was made. The added area becomes a part of the Pendleton district operation.

● Great Northern Railway has completed a $1,000,000 relocation of 5,390 ft. of electrified main line through the Cascades east of Seattle. Although the line was shortened by only 30 ft., the job reduced curves and grade materially.

NOW READY FOR YOU....

THE NEW

"Job Size Roll"

REG. U.S. PAT. OFF.

SCOTCH BRAND No. 33 Electrical Tape

Twelve "Job Size" twenty-foot rolls of "SCOTCH" No. 33 Electrical Tape in a strong neat tube — each roll a convenient one day supply. Your electricians will like it because the new twenty-foot roll is easy to use and easy to carry; YOU will like it because its neat compact tubes take up little storage room and give the tape perfect protection while in stock. The twenty-foot roll is an average day's supply for an electrician with a steady schedule of wiring assignments.

Order from your jobber today and enjoy the convenience and economy of "SCOTCH" No. 33 Electrical Tape in the "Job Size" Roll.

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"SCOTCH" Brand Pressure-Sensitive Tapes, "UNDERSEAL" Rubberized Coating, "SCOTCHLITE" Reflective Sheeting, "SAFETY-WALK" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives.

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THE MAGNO-TRONIC FLUORESCENT STARTER

PROTECTS Fully automatic thermal relay with unusually long life that eliminates blinking lights and protects all auxiliary equipment.

SIMPLIFIES Replacement of worn-out lamp automatically restores closed circuit—replacement of starter unnecessary. No button to push.

REDUCES COSTS Magno-Tronic starters provide exact timing in the lamp electrode—preheating process preventing excessive loss of emission material thereby assuring the maximum in the useful life of a lamp. The established quality of this starter saves considerable time in maintenance and man hours required to repair and/or replace an inoperative lighting unit.

VERSATILE Will operate efficiently over an extended voltage under widely varying temperatures.

GUARANTEED FOR ONE YEAR

The (SP-15-20) for use with either 15 or 20 watt lamps
The (SP-30-40) for use with either 30 or 40 watt lamps
The (SP-100) for use with 100 watt lamps

Ask for descriptive literature

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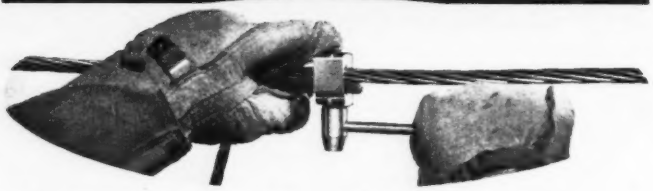
MAIN PLANT Newark 2, N. J.

"Just a Twist of the Wrist"...



and This FARGO "One-Piece" Connector*

Holds Wires with a ¾ Ton Grip!

... built like a vise — grips like a vise

The Fargo "One-Piece" Connector is built on the same principle as the ordinary bench vise, and has the same high mechanical efficiency for converting a tortional force into a compressive one. It provides a sturdy, low resistance connection at a cost no more than other types. At normal tightening torques, the wedging action of its sliding members makes a joint permanently free from loosening troubles. Fargo Connectors are easy to use, too, because with their "one-piece" design, there are no threads to start — no loose parts to lose.

*Approved by Underwriters' Laboratories, Inc.

FARGO

Manufactured by
FARGO MFG. COMPANY, INC.
Poughkeepsie, N. Y.

Distributed by
LINE MATERIAL COMPANY
Milwaukee, Wisconsin

UTILITY ORDERED TO REDUCE BOOK VALUE ON ITS PLANT

Puget Sound Power & Light Co. has been ordered by Washington Public Service Commission to reduce book value of its electrical plant by $9,818,000. The order resulted from an investigation by the state commission extending back to 1944.

Owen Clarke, commission chairman, explained that compliance with the order would bring the company's electrical plant value "into line with the system of uniform accounting for public utilities set up by the state legislature in 1938."

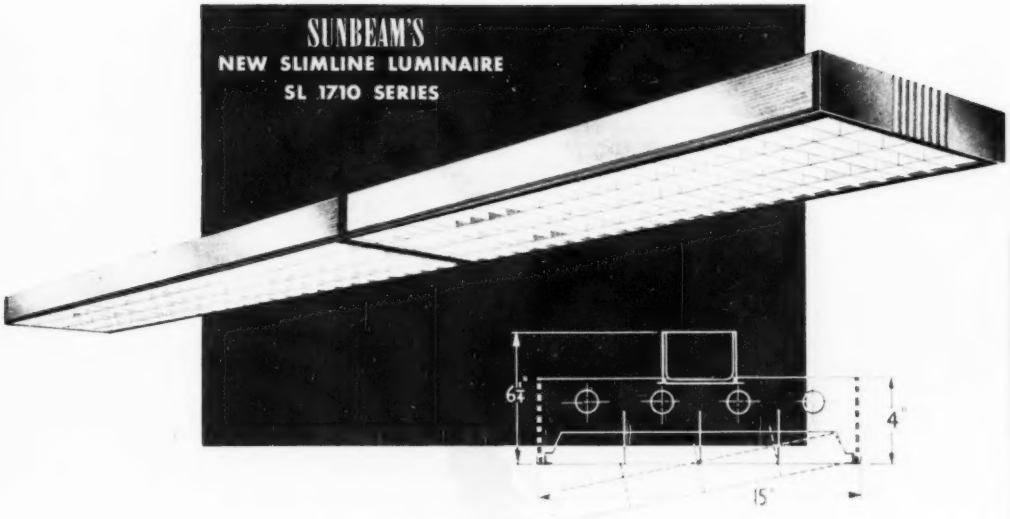
Frank McLaughlin, Puget Power president, said the company would comply with the order. Nothing was said by either side as to what effect, if any, the $10 million enforced reduction in book value might have in negotiations for Puget Power properties now being conducted by public utility districts. The company has been carrying its electrical plant at a book value of about $127 million, exclusive of the properties it has given up to public utility districts by condemnation or negotiation.

McLaughlin said the purpose of the commission's order "is to have the books of the company show the cost of the property when it was first devoted to the public service, regardless of the price Puget paid for the property in building up its integrated system over a period of 60-odd years." The adjustments the commission has ordered, he asserted, "do not represent so-called write-ups or water."

"Naturally, no utility likes to have expenditures for property which were made in the public interest eliminated from its plant account," McLaughlin said. "However, most all of the private electric utilities in the country have had their plant accounts adjusted and it is felt that compliance with the state commission's order is necessary and appropriate and no useful purpose would be served by litigation."

Despite the enforced write down, he declared, book value of the company's common stock would be around $22 a share at the end of the year, or substantially what it was at the close of 1948.

● WESTINGHOUSE ELECTRIC CORP. offered a low bid of $2,094,979 for two generators at Detroit Dam, under construction on the North Santiam River in Oregon. The contract calls for installation and testing of two 55,555-kva, a-c generators, one to be installed and ready for operation by Feb. 1, 1953, the other by July 1 of the same year.



LIGHTING IN THE RIGHT DIRECTION

The progress in better lighting design is achieved by the SUNBEAM Lighting Company through constant illumination engineering and photometric research. The new 96" slimline 1710 series is another proof of this. One of the remarkable features of this thin appearing fixture is the shielding. The 4 lamp unit has 50° x 40° and the 2 lamp has 40° x 40° cutoff. The egg crate louver is hinged from either side for easy maintenance and the side panels are of low brightness Corning Alba-lite. It can be either ceiling or pendant mounted, singly or in continuous rows. The 1710 Series is also available in standard 40W fluorescent with either 2 or 4 lamps and the slimline units can be supplied with 425 MA ballasts and the new 75W T12 lamps.

FOR SUNBEAM'S COMPLETE LINE OF ADVANCED LIGHTING FIXTURES SEE YOUR NEAREST LEADING ELECTRICAL DISTRIBUTOR

SUNBEAM LIGHTING COMPANY • 777 EAST 14TH PLACE • LOS ANGELES 21, CALIF.
manufacturers of BFK lighting fixtures

"IF YOU WANT **DEPENDABLE** AUTOMATIC TIME SWITCHES INSIST ON **TORK CLOCKS**"

When you're selecting automatic time switches for indoor and outdoor uses, remember the name "Tork" for all these advantages.

IDEAL FOR:

Store Windows
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Safety and Street Lights
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DEPENDABLE ACTION! Made with exacting care from finest materials, self-starting all-electric Tork Clocks perform with complete accuracy . . . give years of steady, trouble-free service.

VERSATILE ACTION! Thanks to Tork's many special devices, all standard models can be adjusted to fit your specific needs. Our remarkable device — amazing ASTRONOMIC DIAL — allows for variations in time of sunrise, sunset. We'll gladly explain dozens of others that save extra time, trouble, expense.

EASY INSTALLATION! These compact, modern time switches install with remarkable speed and ease on walls, outlet boxes, etc. Special weatherproof case provided with outdoor models.

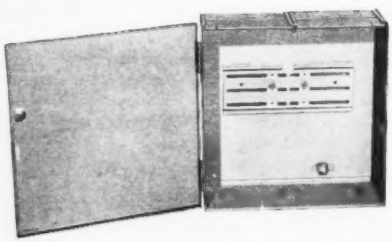
ECONOMICALLY PRICED AS LOW AS $9.50 LIST

Write today for free bulletins with complete product and price details.

TORK CLOCK

TORK CLOCK CO., INC. 1 Grove Street Mt. Vernon, N.Y.

#1130 DUPLEX CABINET— For use with two single phase or two polyphase meters, with facilities for respective test equipment. Incorporates standard twist-outs, and FOR THE FIRST TIME, A TWIST-OUT FOR THE LINCOLN DEMAND METER.



Supplied with seven concentric knockouts for ¾", 1" and 1¼" conduit, test switch bridge. Ample wiring space 15¾" x 15½" x 4½" deep.

SWITCHES ENCLOSURES ACCESSORIES

WESTERN SALES REPRESENTATIVES

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307 Wall St.
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LITIGATION PENDING ON OWENS LAKE FLOODING

Litigation over the flooding of the Owens (dry) Lake by excess waters from the Los Angeles aqueduct may govern use by the City of Los Angeles of its Owens River Gorge power plants, now under construction.

In one suit, a superior court at Santa Barbara has awarded $6,800 in damages to the state government for royalties lost when Los Angeles flooded mineral deposits in the lake bed. A companion suit now pending before the state supreme court would enjoin Los Angeles from dumping the excess waters.

Importance of the judgment and outcome of the pending appeal of injunction granted by a Riverside, Calif., court to restrain Los Angeles from flooding Owens Lake, revolves around the operation of the Owens River Dam and power stations.

The City of Los Angeles owns 300,000 acres of land above Owens Lake from which it drains and stores water from the Mono Basin through a system of dams and tunnels. The state contends that the dam should be used for flood control, and that water used for power, if it involves more than the existing Los Angeles Aqueduct's 446 sec. ft. capacity, should not be allowed to flow into Owens Lake, interrupting mineral operations.

Los Angeles maintains that adequate use of its water collection system and powering of its new hydro plants require diversion of water in excess of the aqueduct capacity.

While granting the state royalty rights for one of the periods during which the lake was flooded, the court decision denies the state's contention that, because the lake has been dry since 1913 when the aqueduct began operation, it necessarily must remain dry.

The judgment further denied any permanent damage whatever to the salt body or brines of the lake as a result of the floodings.

● ELLENSBURG, Wash., city council recently called for bids for the purchase of a 500-kv. diesel power plant with generator and controls. The equipment is expected to cost about $31,000, will supplement output of the municipal hydro plant and provide stand-by power for its main water wells.

● IDAHO POWER CO. has completed construction of a substation at New Meadows and a 50-mile line from the station to Cambridge. The new line will serve as a tie with company hydro plants on the Snake River.

NEWEST LAB FURNACE!

HEAT-POWERED WITH NICHROME*V

Hevi Duty Electric Company has introduced a revolutionary new development in laboratory furnace equipment—for requirements such as drying of precipitates, ash determinations, fusions, ignitions, heat treating, enameling and ceramic firing, and general laboratory work.

Housed in a cylindrical shell, the furnace is mounted with practically line contact on a base containing instruments and controls—a type of construction that permits the base to remain at almost room temperature, with instruments and controls easily accessible at all times.

Operating temperatures from 900°F. to 1850°F. are obtainable —precisely controlled by means of a manually operated 36-step, tap-changing transformer.

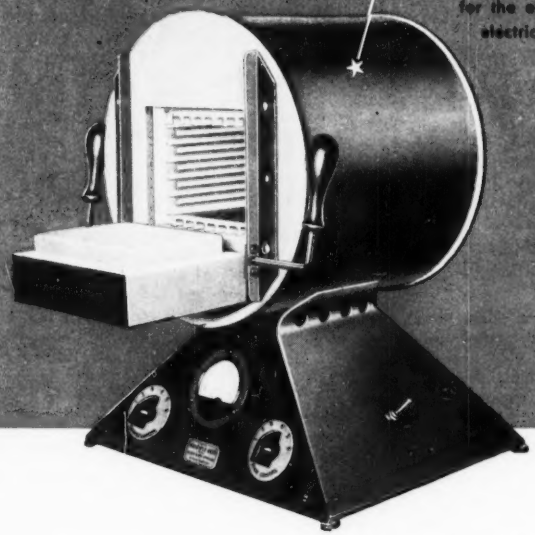
Outstanding characteristics of this new type furnace are rapid heating (about 85 minutes from cold to maximum temperature), and quick response to demand for temperature change.

To assure heating elements that will "stand the gaff" and give top-level performance under such punishing conditions, Hevi Duty Electric Company uses high heat- and corrosion-resistant Nichrome V. The absolute uniformity of this superior alloy assures even heat distribution; its retention of physical and electrical properties at high temperatures, enables critical adjustments to be made and maintained; its resistance to thermal shock assures long life, completely dependable and economical service.

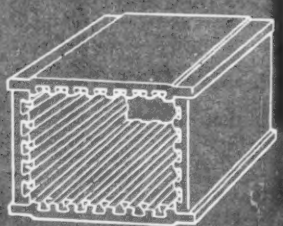
Whatever your electrical resistance problem, consult with us. In addition to world-famous Nichrome V and Nichrome, we make over 80 alloys for the electrical and electronic industries—the most complete line of electrical resistance alloys in the world.

New Model 861 Hevi Duty Muffle Furnace

Standard for use on 115 v. or 230 v., 50 to 60 cycles, A.C. Input: 1150 watts. Maximum operating temperature: 1850°F. 36-step control down to approximately 900°F. Heating elements: 22 gauge Nichrome V wire.



Heating units, top and bottom, are interchangeable; likewise, the two side units. All units are easily replaceable and reversible (permitting the coiled Nichrome V wire to be exposed or muffled).



NOTE: Nichrome V elements are also used in standard model, industrial Hevi Duty furnaces designed for operation up to 2000°F.

*Nichrome is manufactured only by

Driver-Harris Company

HARRISON, NEW JERSEY

BRANCHES: Chicago, Detroit, Cleveland, Los Angeles, San Francisco, Seattle
Manufactured and sold in Canada by
The B. GREENING WIRE COMPANY, LTD., Hamilton, Ontario, Canada

50TH YEAR
SPECIAL PURPOSE ALLOYS SINCE 1899
DH
TRADE MARK REG. U.S. PAT. OFF.
1899 - 1949

*T.M. Reg. U.S. Pat. Off.

AVIATION WARNING LIGHT SUBJECT OF RESEARCH

In cooperation with the Bonneville Power Administration, the Division of Industrial Research of the Washington State Institute of Technology has begun research projects to develop an aviation warning light capable of drawing its power from the high-voltage line to which it is attached. They also will study methods of combating vibration in transmission lines.

Bonneville has many power lines crossing rivers and, in accordance with CAA regulations, must maintain a warning light on the tower on each bank of the river. The Division of Industrial Research hopes to design a light that will derive its power from a 200- to 300-kv. transmission line, not only at river crossings, but at any other place where plane traffic is dangerously close to electric power lines. It will build a cage that can be insulated from the cable, then make an effort to utilize the electrostatic charge between the cable and a concentric screen conductor to operate a neon light within the cage.

To analyze vibration, a 150-ft. span will be erected and vibration-inducing equipment set up to simulate field conditions. Suitable absorbers, dampers, reinforcements and conductor cables then will be selected.

Homer J. Dana, director of the engineering experiment station, is in charge of the first project; Dr. Bernard Fried, assistant professor in mechanical engineering, of the second.

Seattle Moves to Protect Station Near Boeing Field

To protect its South substation from dangers incident to aircraft operations from Boeing Field, Seattle City Light will cooperate with the Aeronautics Administration in a program to protect a large residential and business area. The CAA's cooperation was asked by Mayor William Devin last July, following a Boeing Field plane crash into Georgetown homes, with property damage and loss of life. City Light's substation is located in the north approach to Boeing Field, and R. D. Bedinger, regional CAA director, recommended installation of two beacon lights of different types at designated locations. The letters "HAZ" or the full word "Hazard" will be painted on prominent buildings within the danger area. The CAA will also notify airmen to avoid flying over the substation when possible.

● A PORTABLE electric transformer capable of handling 110,000 hp. is being built by Westinghouse for Bonneville Power Administration. It will cost approximately $400,000 and will be delivered in 1951. It will be mounted horizontally on a special railroad flat car to be moved from one location to another as needed. Rated at 83,333 kva., the unit will be about 25 ft. long and will weigh 135 tons. It will take power at 220 kv. and will step it down to 110 kv. when it is used as an autotransformer, or an isolated secondary winding will provide the full kva. rating at 57 kv. A tertiary winding will provide power at 13.2 kv.

● PACIFIC POWER & LIGHT CO. has started construction on an eleven-mile section of line, final link in the project connecting central Oregon with the Northwest Power Pool through a substation at The Dalles, Ore. The line runs from The Dalles to Dufur and will cost approximately $150,000, bringing the total cost of the project to more than $1,000,000. Completion of the line is scheduled for November.

● MONTANA Power Co. has cut over 224 miles of transmission line and 15 substations to a new higher voltage of 69 kv. The e lines, serving the Great Falls-Chester-Havre triangle, formerly operated at 50 kv. The voltage increase is the second step in the last two years to provide more power for the area. A 54-mile transmission line was completed from Fort Benton to Chester in 1948.

● M. & M. OPERATING CO., Oswego, Ore., offered a low bid of $129,000 for clearing the right-of-way for the Warm Springs section of the Maupin-Detroit 230-kv. transmission line of the Bonneville Power Administration. The new line will carry power to Detroit Dam, under construction on the North Santiam River, a unit in the Willamette Basin flood control, power, and irrigation project.

● SEVEN 56,500 kva. single-phase, 3-winding power transformers for McNary Dam power plant have been ordered from Moloney Electric Co. by the Corps of Engineers. The contract calls for $857,300. Electric Machinery Mfg. Co., on a bid of $154,789, won the contract for two 3,750-kva. a-c generators and appurtenances for power house service units.

● CITY OF SEATTLE has ordered three hydraulic turbines from the Baldwin Locomotive Works for installation in the Ross Power Dam power house in 1952 and 1955. Each turbine will drive a 90,000-kw. generator. Contract price is $2,641,200.

VACATION-WITH-PAY ISSUE TURNED DOWN BY COUNCIL

Vacation-with-pay, the controversial issue taken once more to the Council on Industrial Relations for the Electrical Contracting Industry by the Northern California Chapter, NECA, for its Alameda and Contra Costa county branches, was turned down by the council. The council also recommended that the union negotiate with the contractors for a maintenance rate.

Two other Western cases taken to the council resulted in raised wage rates. The Utah Chapter lost its plea to keep the rate the same as during the past year. San Jose contractors lost theirs and the scale was raised to $2.50 an hour, uniform with others in the area, effective Sept. 5, however, instead of retroactive to July 1.

● CITY of SPRINGFIELD, Ore., has signed a contract with Bonneville for electricity for its proposed municipal plant. Mayor B. P. Larson previously announced that the city would be in the power business by January 1950, whether it purchased Mountain States Power Co.'s distribution system or constructed a competing system. The municipality recently signed an agreement with Pacific Telephone and Telegraph for joint use of poles, in event the city builds its own system.

● LINE, SERVICE and office personnel of Pacific County at Raymond, Wash., PUD No. 2, struck last month in protest against Manager Frank Feelve, who was brought into the county last summer to succeed R. D. O'Neil, now operating engineer. Workmen said they had asked that Feelve be removed at a meeting on Sept. 2 and would stay off the job until commissioners complied with their request.

● GRAND COULEE'S twelfth 108,000-kw. generator went on the line last month. It is the third machine to be installed in the right power house. Number four generator for the right power house is being removed now from the Westinghouse East Pittsburgh plant.

● FOR ITS OUTSTANDING newspaper advertisements Coast Counties Gas & Electric Co. recently won one of two awards presented to northern California advertisers at the 46th annual convention of the Advertising Assn. of the West, held in Vancouver, B. C.

● PACIFIC GAS AND ELECTRIC Co. has purchased the electrical distribution system of the Chico (Calif.) Municipal Airport, formerly the Chico Army Air Base, for $44,000.

CRESCENT
SYNTHOL BUILDING WIRES

TYPE TW
For Both Wet and Dry Locations

FOR BETTER WIRING

Simplify Your Stock Problem

USE THIS ONE TYPE FOR ALL YOUR BRANCH CIRCUIT REQUIREMENTS

CRESCENT SYNTHOL —Type TW, Building Wires and Cables are insulated with a special, tough, thermoplastic compound that results in wires of unexcelled Permanence, Safety, Adaptability and Value. They combine high dielectric and mechanical strength with the following desirable features.

SMALL DIAMETER—has smallest outside diameter for same conductor size, permitting more conductors, or larger conductors in same space.

FLAME RETARDING—SYNTHOL insulation will not support combustion.

LONG LIFE—practically unaffected by continuous exposure for years to sunlight or air; more stable than any rubber insulation.

RESISTANT to moisture, acids, alkali and most chemical solvents.

OILPROOF—cutting oils, greases and petroleum solvents do not injure SYNTHOL.

BRIGHT COLORS—non fading, the insulation is the same color throughout so color will not scrape off; easily cleaned; twelve colors.

FREE STRIPPING—makes splicing and soldering easier and faster.

EASY PULLING—because SYNTHOL wires have a permanent clear wax lubrication on their hard, smooth, abrasion resistant surface.

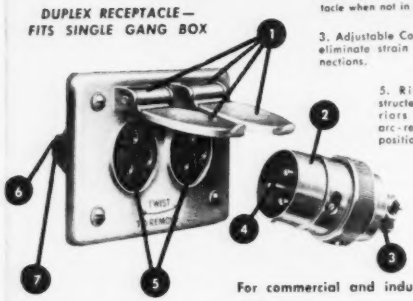
AVAILABLE FROM LOS ANGELES WAREHOUSE
Murphy-Hain Co., 720 E. 2nd St., Los Angeles 12, Calif.

CRESCENT
WIRE & CABLE
CRESCENT INSULATED WIRE & CABLE CO.
TRENTON, N. J.

NEW! R&S AUTOMATIC LOCKING Midget EVER-LOK PLUGS, RECEPTACLES & CORD CONNECTORS

FOR SAFE, DEPENDABLE PERFORMANCE

DUPLEX RECEPTACLE— FITS SINGLE GANG BOX



1. Spring hinged, gasketed covers close receptacle when not in use.
2. Plated steel housings fully protect the contacts.
3. Adjustable Cord Grips eliminate strain on connections.
4. Contacts are precision-made, self-wiping, and self aligning.
5. Rigidly constructed, all interiors of molded arc-resisting composition.
6. Heat-treated beryllium copper contacts and terminals . . . an advanced EVER-LOK feature.
7. Compact design provides ample capacity, yet allows for easy wiring.

For commercial and industrial applications.

All units are steel clad, fully grounded and are complete with the R&S Ever-Lok automatic feature that positively eliminates strain on contacts or connections.

10 ampere 125 or 250 V. A.C. or D.C.

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SALES OFFICES IN PRINCIPAL CITIES

Full details in catalog EL49- 10

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RUSSELL & STOLL COMPANY, INC.
Precision-Built Electrical Equipment
125 BARCLAY STREET, NEW YORK 7, N. Y.

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Molding Mica — Flexible Mica
Segment Mica — Fiberglas and Mica
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And all types of mica combination for your electrical requirements—sheet, tubes, and fabricated parts.

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NEW ENGLAND MICA CO.

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ECONOMICAL
Jeffries Transformers

Reasonable in Price
Reliable in Performance

Jeffries large transformers are priced reasonably—and you can save their first cost in a short time by minimizing current losses. When you use a Jeffries transformer, you can provide voltage change at the point desired, without prohibitive expense.

We supply all types and sizes. If not in stock, we build to order in a hurry—a week to 10 days.

Write today for catalog.

JEFFRIES TRANSFORMER COMPANY
1710 E. 57th St. Los Angeles 11, Calif.

NEWS ABOUT PEOPLE

● Northwest Electric Light & Power Assn. recently awarded the following Pacific Power & Light Co. employees with honorary life memberships: H. H. Schoolfield, engineering consultant; J. H. Siegfried, former superintendent of power; S. B. Clark, former superintendent of the Portland underground department; and Tom Perry, former superintendent of the Northwestern division.

● Harold Q. Noack is the new division vice-president, central sales division, of Columbia Steel Co., according to O. L. Pringle, Columbia's vice-president in charge of sales. With offices in San Francisco Noack will direct sales functions in central and northern California. Before joining Columbia Steel Co., Noack was Pacific Coast manager for Phelps Dodge Copper Products Corp.

● Arthur D. Bragg is the new Pacific District manager of General Electric Co.'s apparatus department, succeeding Allen C. Jones, who retired on Oct. 1. Bragg has been assistant district manager of the apparatus department and district manager of the Central Station Division. Jones had been with G-E's San Francisco office since 1908.

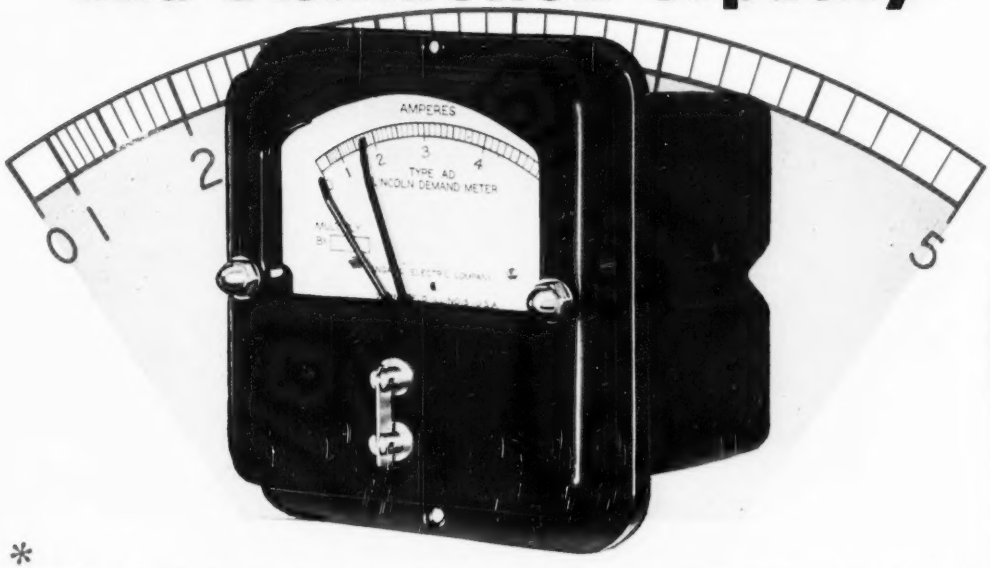
● J. Norman Olsen has been appointed district manager of the new power district of the British Columbia Power Commis ion in the Courtenay, Cumberland, Comos, Royton area on Vancouver Island. He will also continue as manager of the Campbell River area.

● John J. Howard, project manager for California Electric Construction Co., subcontractors on Metropolitan Life Insurance Co.'s Parklabrea housing project in Los Angeles, has been advanced to vice-president and general manager of the electric construction company.

● Allan M. Eyre has been appointed assistant to the superintendent of Fraser Valley interurban and New Westminster city transportation lines of the B. C. Electric Railway Co., headquartering at New Westminster.

● C. T. Hurd, manager of the Cowlitz PUD at Longview, Wash., resigned on Sept. 1. He had been manager since 1946.

Get the Most out of System and Distribution Capacity*



*

LINCOLN Type AD-2 Thermal Ampere Demand Meters

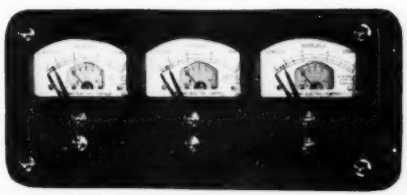
measure the factor which determines the capacity of Substation Feeders

Lincoln Type AD-2 Meters are particularly useful in balancing the load between phases on feeder lines to help you get the most out of system and distribution capacity.

These meters are designed for either semi-flush or surface mounting on electric power switchboards, and are equipped with two demand indicating pointers. One pointer is attached to the actuating element of the meter and continually shows the demand on the feeder phase. The second pointer indicates the maximum demand by remaining at the highest point established since the last manual resetting.

Lincoln Type AD-2 Meters are available with either 3, 5, or 6 ampere full scale ratings. They can be supplied with an instantaneous indicator to immediately show if the load has been picked up after the feeder switch is closed.

Complete information is given in Bulletin 462. Write for your copy.



Type AD-2 Meters are also available in triplex form in either horizontal or vertical design.

50TH ANNIVERSARY SANGAMO 1899 - 1949

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

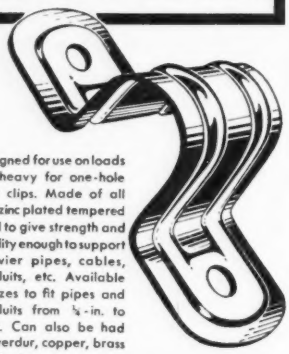
SM-608

ALL the strength and durability inherent in steel are combined—with definite economies—in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

MINERALLAC 2-HOLE
PIPE STRAPS
For Heavier Loads!



Designed for use on loads too heavy for one-hole Jiffy clips. Made of all new zinc plated tempered steel to give strength and rigidity enough to support heavier pipes, cables, conduits, etc. Available in sizes to fit pipes and conduits from ½-in. to 1-in. Can also be had in Everdur, copper, brass or aluminum.

Send for literature and prices

Specify MINERALLAC HANGERS, CLIPS, STRAPS, BUSHINGS

MINERALLAC ELECTRIC COMPANY
23 N. Peoria St., Chicago 7, Illinois

MINERALLAC

● CENTRAL ARIZONA LIGHT & POWER Co.'s president, HENRY SARGENT, has announced reassignments of executive duties within the company. Sargent assumed the general manager duties as a result of the administrative changes. LOU DOUTRICK has become executive vice-president, with GEORGE GROH, vice-president in charge of operations, reporting to Doutrick. A. H. FORMAN JR. has been appointed assistant to the president. In addition he will be responsible for rate and budget matters. Vice-president JOHN KIMBALL has taken on full responsibility for the general sales and personnel department.

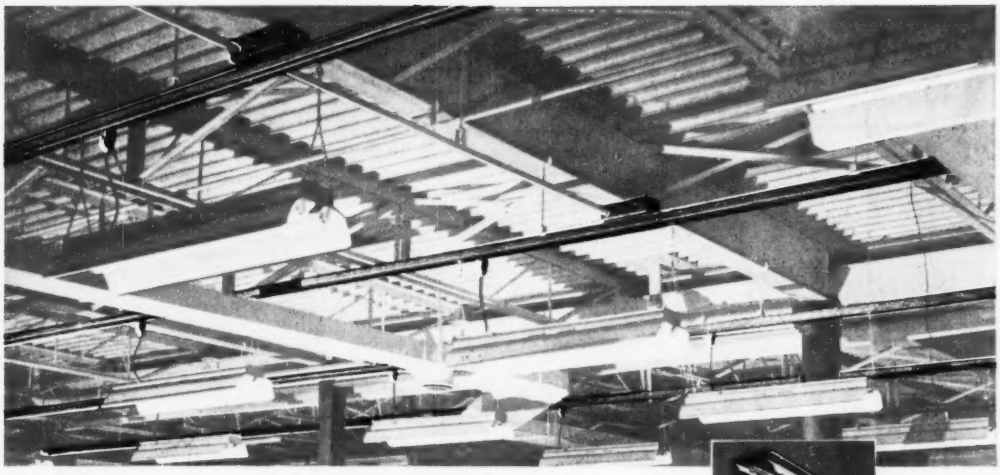
● WALTER J. MAYTHAM JR. of Chicago has taken over the duties of Pacific Coast district manager for Westinghouse Electric Corp., headquartered in San Francisco. He replaces CHARLES A. DOSTAL, vice-president, who will retire next May after more than 43 years of service with Westinghouse. Dostal will handle special executive assignments until his retirement. For the past nine years Maytham has been manager of industrial sales in the company's Northwestern district, with headquarters in Chicago.

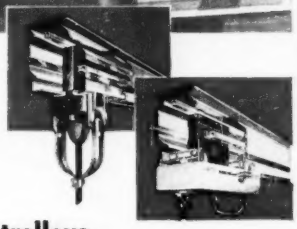
● HAROLD M. HANSEN, formerly district appliance and radio manager for Westinghouse Electric Supply Corp. at Los Angeles, has been appointed multiple housing sales manager for WESCO, with headquarters at the Vernon branch. Hansen joined the company in 1948 as a kitchen cabinet specialist. In July 1948 he was appointed multiple housing manager. He was named district appliance manager in March 1949. Four months later he was appointed district appliance and radio manager, serving in that capacity until his new appointment.

● WILLIAM L. GAFFNEY, chief electrical inspector for the city of Tacoma, and secretary-treasurer of the Northwestern Section, IAEI, has been appointed as alternate to L. W. GOING on the correlating committee of the National Electrical Code Committee, NFPA.

● WILLIAM S. MCCALL has been appointed sales manager of the portable dishwasher division of General Electric Appliances Inc., Los Angeles. His former position as sales manager in charge of apartment house and new construction sales has been taken over by ROBERT HIGHMAN.

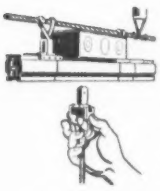
● THE WESTINGHOUSE Order of Merit was awarded recently to RALPH A. HOPKINS, supervisor of central station and transportation sales for Westinghouse in the Los Angeles area.





NOW...a Busway for Lighting and Small Power Tools

New FLEX-A-POWER is every inch an outlet for plugs or trolleys



Now . . . Trumbull introduces the busway for 50 amp service—lighting, small tools, business machines, appliances. It's the LTG FLEX-A-POWER—an outgrowth of Trumbull's 20-year experience with the heavier FLEX-A-POWER used so successfully throughout industry.

NO PRODUCTION BREAKS FOR RELOCATING LOAD OR RE-WIRING

Whether it's a run of ten feet or one thousand, LTG is a potential outlet every inch of the way. It can be instantly tapped by plug or trolley—*any place.*

The load can go where it's needed—not just where there's a fixed outlet—and without long extension cords.

LOWER COST INSTALLATION—EASY RELOCATION

Prefabricated LTG sections are installed much more quickly than wiring and conduit. Systems can be dismantled and reinstalled—or extended—with ease and economy.

MOST EFFICIENT PLUG-IN SYSTEM

Exclusive—plug or trolley can be inserted anywhere. *Exclusive*—no drop-out sections (which weaken system). *Exclusive*—two, three or four-pole systems in same compact housing. Each 10 foot length will support 250 lbs. at any point.

NEW FREE BULLETIN TELLS why LTG FLEX-A-POWER is less expensive, more practical than wiring and conduit... more flexible, more rugged than any other busway in its class. Send coupon now.

THE TRUMBULL ELECTRIC MANUFACTURING COMPANY
PLAINVILLE, CONN.

I want to know more about *savings* and *flexibility* with LTG FLEX-A-POWER. Please send Bulletin TEC-3.

Name.....

Company.....

Address.....

City.....Zone.....State.....

Men Who Observe the Best Electrical Practice Make It a Practice to Use

TRUMBULL (T) ELECTRIC

TRUMBULL'S TRAINLOAD OF NEW PRODUCTS

EXTRA Holding Power
QUICKLY Installed
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For new construction and maintenance —Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resilient, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

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GIVE YOUR MOTORS & GENERATORS
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HELWIG CO., HELWIG SPEER Carbon Products

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ALWAYS SPECIFY THE BEST
WHITER THAN WHITE
ABOLITE Lighting
• Industrial
• Commercial . . . Floodlighting
• Pump Island Installations
The JONES METAL PRODUCTS CO.
WEST LAFAYETTE, OHIO
Sold Exclusively through Electrical Wholesalers

● A. B. DARBY, formerly branch manager for Westinghouse Electric Supply Corp. at Boise, has been appointed district appliance and radio manager for that company, headquartered at Los Angeles. Darby will be responsible for appliance and radio activities at the Phoenix, Salt Lake City and Boise branches, with coordinating responsibility at the Vernon branch of WESCO.

Deaths

● LEO W. BARCLAY, 56, public relations director for Los Angeles Department of Water & Power, died in Los Angeles recently. His death was caused by complications arising from a throat operation last January. Mr. Barclay had been employed by the utility for 16 years, the last four years as head of the public relations department. In 1922 he came to California to become West Coast exploitation director for Goldwyn Pictures, resigning two years later to establish his own advertising business.

● ARTHUR GEORGE JAMES, 50, city planning engineer of Palo Alto, died recently of complications due to leukemia. Mr. James spent two years with the Great Western Power Co. at Sacramento before becoming assistant city engineer for Palo Alto. After serving as a commander with the Navy Civil Engineer Corps in World War II, he returned to Palo Alto as a consulting civil engineer and later became planning engineer to the city planning commission.

● ALFRED K. BOUVIER, 28, an engineer on the Southern California Edison Co. dam project near North Fork, Madera County, Calif., was killed in an automobile accident recently.

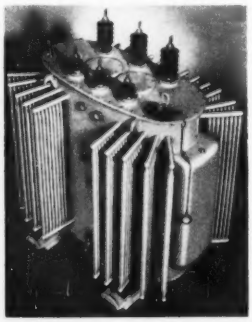
● WILLIAM G. WHITNEY, 53, supervisor of estimates and records of the DeSabla division of Pacific Gas and Electric Co. for 23 years, died recently in Chico, Calif. He was chairman of the Shasta division of the American Institute of Electrical Engineers.

● GERALD J. LAWLER, 50, general accounting supervisor for Portland General Electric Co., died in Portland recently after an extended illness. He had been employed by the electric company since 1923.

● EUGENE C. BLODGETT, turbine engineer and specialist for General Electric Co. in the Los Angeles area until his retirement in 1948, died recently at Altadena, Calif.

Pennsylvania
STANDARD PARTS
POWER TRANSFORMERS
Custom built transformers at Quantity Production Prices

Streamlined methods of manufacturing, plus standard designs and standard parts, shorten engineering and production time to reduce prices and speed deliveries.



Single and three phase sizes up to 10,000 KVA, 69 Kv

Transformers can be supplied with any method of oil preservation.

WRITE for Catalog No. 1492.

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600 S. Highland Avenue, Los Angeles
VAndike 5533
GEO E. HONN CO.
420 Market Street, San Francisco
SUtter 1-7352

POSITION SOUGHT

Electrical Engineer, 42, administrative and technical experience in generation, transmission, distribution, seeks West Coast position with operating company, consultants, or manufacturing firm. Twenty-two years experience system planning, design, application covering generators, transformers, lines, relays, circ. breakers, motors, in operating company eastern U. S., design-consulting company and large manufacturing company. Professional Engineer license New York, U. C. graduate.

Write ELECTRICAL WEST, Box 256 68 Post St., San Francisco 4, Calif.

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Bought and Sold
New and Rebuilt
ELECTRIC EQUIPMENT CO.
ROCHESTER 1, N. Y.

APRIL, 1950 issue of Electrical West in supplement form, will list again Directories of Manufacturers, Western Offices and Sales Representatives, Where-to-Buy-in-the-West and Appliance Service and Repair Parts.

CUT POLE-TOP SWITCH COSTS!

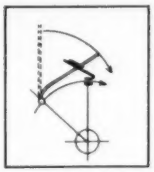
DEAD-END CONDUCTORS *DIRECT* TO NEW KPF TYPE "A" SWITCHES!

NEW QUICK-BREAK ATTACHMENT FOR KPF SWITCHES

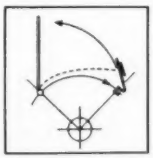
THE SPLIT-SECOND BREAKING SPEED of this new KPF Quick-Break Attachment means you can now switch many high-voltage circuits without employing expensive circuit breakers.

This new attachment is already in use opening 60 kv loops with loads up to 12,000 kva; in switching 1080 kva, 11 kv capacitor banks; and in other applications including the dropping of 32 miles of 69 kv line.

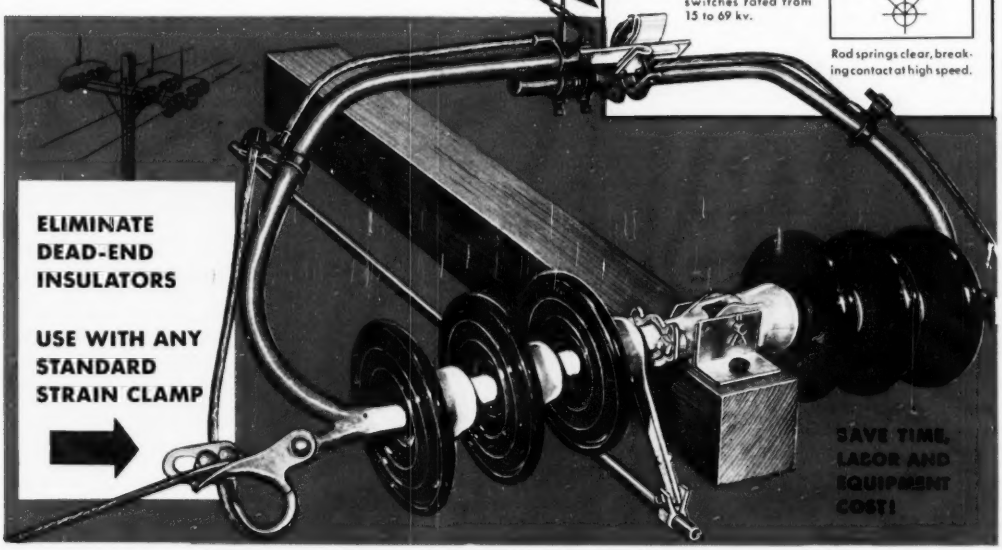
The KPF Quick-Break Attachment fills the gap between simple disconnects and expensive circuit breakers. It is available for all KPF switches rated from 15 to 69 kv.



Spring rod winds to full tension as switch opens.



Rod springs clear, breaking contact at high speed.



DEAD-END LINES HOT to these new KPF Type "A" Pole Top Switches—and save! Eliminate dead-end insulators; use any type of standard strain clamp!

KPF Type "A" Switches are simple in design, ruggedly constructed, and easy to install. They consist of two insulator stacks with a bearing assembly that permits stacks to be adjusted to normal line sag. Patented, free-floating, self-aligning contacts maintain proper contacts under any conditions of switch sag adjustment. Switch arms and dead-end eye are integral with the insulator assembly. The forged dead-end eye is of standard dimensions, so it will accommodate standard strain clamps. This makes for faster, more convenient hot line installation. The interphase control is of the push-pull type, which means that switch operation is unaffected by cross-arm warpage—even after long periods of idleness.

KPF air-break switches have been proven in thousands of applications during the past 40 years.

KPF

FIND OUT HOW KPF TYPE "A" SWITCHES CAN SAVE FOR YOU! WRITE TODAY FOR DETAILS!

K·P·F ELECTRIC COMPANY · 855 Howard Street · San Francisco 3, Calif.

NEW BOOKS for ELECTRICAL MEN

HERE are four up-to-date guidebooks for everyone who wants to keep up with most recent advances in electricity and electronics. Every book listed is written by an outstanding authority who provides working information in straightforward language.

1 BASIC TELEVISION PRINCIPLES and SERVICING

By BERNARD GROB, Instructor, RCA Institutes, Inc. 592 pages, 6x9, over 400 tables, charts, illustrations, $6.50.

An A to Z manual for everyone concerned with TV receiver installation and servicing. You get a detailed picture of both AM and FM circuits, operation and servicing. Simplified drawings, schematic diagrams, photographs and circuit-block treatment give you clear explanations of every topic. Covered are timely subjects like—oscilloscope operation, intercarrier sound receivers, deflection circuits, projection systems, simultaneous and sequential color TV, etc. Trouble-shooting charts show symptoms, causes and cures for over 50 typical receiver problems.

2 POWER CAPACITORS

By R. E. MARBURY, Westinghouse Electric Corporation. 202 pages, 6x9, fully illustrated, $3.50.

A clear discussion of the design, manufacture and use of power capacitors and the benefits you can expect when you apply them to specific circuits and systems. This book assembles a wealth of useful data, covering capacitors for 60 cycle power circuits, high frequency capacitors for frequencies up to 12,000 cycles, capacitors for high voltage AC and DC circuits, etc. Accessories, operating limitations, applications, power factor, and automatic controls are discussed thoroughly.

3 MAINTENANCE MANUAL of ELECTRONIC CONTROL

Edited by ROBERT E. MILLER, Weller Manufacturing Company; 304 pages, 6x9, 200 illustrations and circuit diagrams. 16 charts. $4.50.

A practical installation, maintenance, and service manual covering: electronic relays and timing relays, photoelectric relays, electronic motor control, electronic resistance-welding control, electronic temperature control systems, and sealed-ignition rectifiers. This guidebook explains reading of diagrams, use of test equipment, handling and storage of apparatus, use and adaptation of the oscilloscope, etc.

4 ELECTRICAL ESTIMATING

By RAY ASHLEY, Research Engineer, Electrical Contractors' Assn. of City of Chicago; Technical Director, National Electrical Contractors' Assn. 307 pages, 6x9, illustrated. $6.50.

Here's down-to-earth information on every phase of electrical estimating—training estimators, forms, tools and their proper use, line studies, plans and specifications, checking material quantities, preparing final bid sheets, markups, etc. Guides and sample estimates of actual constructions, taken from recent cases, are included. Data are applicable to all types of electrical construction, includes Industrial, commercial, institutional, transportation, etc.

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NOTES ON THE TRADE

● OSCILLOGRAPH service is available in General Electric's Denver service shop, according to R. W. Hoops, head of the shop's meter and instrument section. The new service is available to anyone in the Rocky Mountain area who has problems concerning transient characteristics of motors and generators and to anyone wishing accurate recordings of strain, pressures and other electrical phenomena affecting apparatus, Hoops said.

● PERMANENTE METALS CORP., Oakland, Calif., has bought property for a loading dock at Lititz near the bauxite deposits of southern Jamaica. The company has spent some $250,000 since mid-1948 in a program exploring the deposits as a potential source for its aluminum production and holds options on a number of bauxite bodies there.

● BUCHANAN ELECTRICAL PRODUCTS Corp. of Hillside, N. J., has announced appointment of Shaffer and Nelson Inc. as sales representatives for its electrical fittings and devices in Washington, Oregon, Idaho, western Montana and Canadian provinces of British Columbia and Alberta. Shaffer and Nelson have offices in Seattle and Portland and warehouse facilities in Seattle.

● L. M. GUIBARA has been appointed Pacific Coast division sales manager of United States Rubber Co. to supervise sales of electrical wire and cable. With headquarters in Los Angeles, he will be in charge of branch sales in Los Angeles, San Francisco, Portland, Seattle and Salt Lake City.

● BETHLEHEM PACIFIC COAST STEEL Corp. has purchased eight acres of land at 8531 E. Marginal Way in Seattle as site for a structural steel fabricating shop. It is expected that the new facilities will be ready for operation about April 1950.

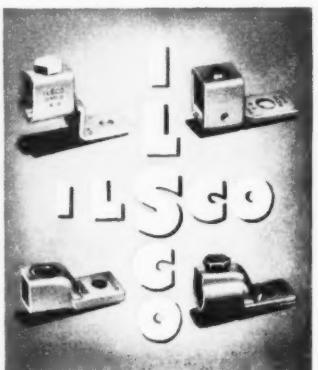
● COLUMBIA ELECTRIC & MFG. CO., Spokane, has been awarded a contract for providing lighting fixtures for the Texas Oil Co.'s building in Houston. The firm will also fabricate the lighting fixtures for a building to be used by the Atomic Energy Commission at the Sandia air base in New Mexico.

● GRAYBAR ELECTRIC CO., Salt Lake City, has moved to new quarters at 336 North Third West St.

Gwilym A. Price of Pittsburgh, president of Westinghouse Electric Corp., visited Western properties last month

● S. & C. ELECTRIC CO. has announced the appointment of Charles E. Klaus to represent S & C products in Oregon, Idaho and western Montana, with offices at 303 S. W. First Ave., Portland.

● MURRAY OWEN has been named general sales manager of Western Insulated Wire Co., Los Angeles. He formerly was associated with General Electric Co.



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SOLDER LUGS . . . SERVICE CONNECTORS . . . FUSE CLIPS TERMINALS . . . SHADING COILS

NEW 80-page catalog now ready showing over 2,000 Ilsco items in color.

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ILSCO COPPER TUBE & PRODUCTS, Inc. CINCINNATI 27, O.

EASY-TO-GET-AT ACCESSORIES

Speed Inspection and Servicing

OF ALLIS-CHALMERS NETWORK TRANSFORMERS

FLUSH TYPE LIQUID GAUGE is easy to read. High impact strength tempered gauge glass is given additional protection of heavy bronze cover.

THERMAL INDICATOR shows operating temperature as well as maximum reading . . . is specially gasketed for complete waterproofing.

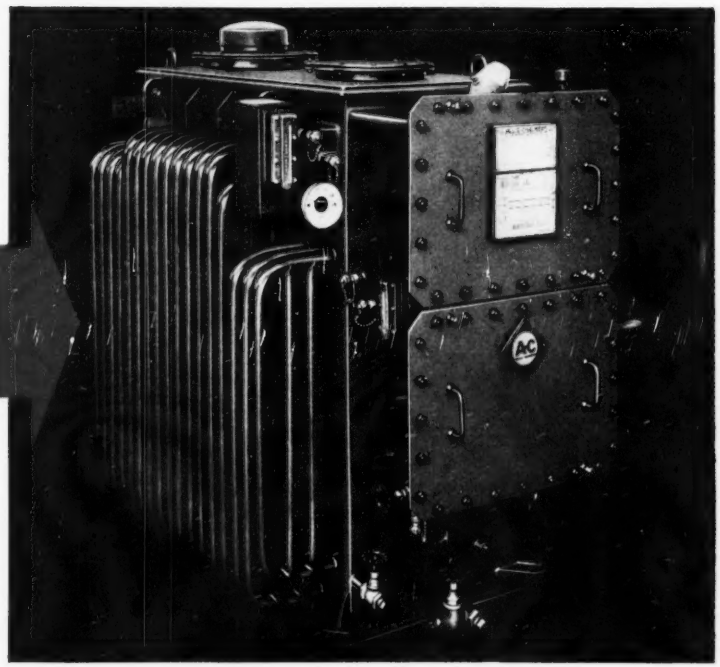
AIR TEST VALVE with spring-actuated, self-closing arrangement gives positive protection against infiltration of foreign material.

LIQUIDSAMPLING DEVICE used on *Chlorextol**-Liquid filled transformers is hand rotated to enable sample to be taken at liquid level.

TOP FILTER PRESS VALVE is located near drain valve for convenience. Internal connection is piped to diagonally opposite corner of tank, providing a cross flow to assure complete interchange of liquid.

RELIEF DIAPHRAGM on cover of *Chlorextol**-Liquid filled transformer protects transformer in the event of abnormal operating pressure.

COMPLETE DRAIN VALVE and bottom filter press connection. Special valve design permits accurate liquid sampling.



HERE'S PICTORIAL PROOF of the convenient and logical arrangement of accessories on Allis-Chalmers Network Transformers.

Note that gauges are located for quick observation, and testing devices are placed for easy operation with a minimum of motion. All accessories are built for dependable service . . . are unaffected by corrosive atmospheres or flooding.

Careful design of accessories typifies the solid engineering — from core to case — that has built wide acceptance for A-C Network Transformers in every part of the country.

For further information, write today for bulletin 61B6152A, or contact your nearby A-C sales representative.

A-2696

ALLIS-CHALMERS, 939A SO. 70 ST. MILWAUKEE, WIS.

*Non-inflammable insulating liquid, *Chlorextol* is an Allis-Chalmers trademark.

ALLIS-CHALMERS

Network Transformers—Nearly 1,000,000 KVA Installed

GOOD WIND-ABILITY

GOOD WORKABILITY

are qualities found in
Essex Extra-Test Magnet Wire

Essex Extra-Test Magnet Wire has the good wind-ability and workability necessary for random or layer winding at any speed.

It slides evenly and smoothly in place; results in maximum turns in minimum space and in coils that pack tight.

When Essex Extra-Test is used for motor armatures its extra abrasion resistance reduces possibility of damage to insulating film, no matter how narrow the slots.

When you specify Essex Extra-Test Magnet Wire for layer winding you insure against broken wires, crossed turns, runbacks, spaced turns and frequent tension adjustments. Write for prices.

WIRE SX PRODUCTS

ESSEX WIRE CORPORATION
FORT WAYNE 6, INDIANA

Plants: Fort Wayne, Indiana; Detroit, Michigan; Anaheim, California. Warehouses and Sales Offices: *Atlanta, Georgia; *Boston, Mass.; *Chicago (1), Cleveland, Ohio; Dallas, Texas; Dayton, Ohio; *Detroit (Mich.); *Kansas City, Mo.; *Los Angeles, Calif.; Milwaukee, Wis.; *Newark, N. J.; Philadelphia, Pa.; *Portland, Oregon; *St. Louis, Mo.; *San Diego, California; *San Francisco, California.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, AND CIRCULATION REQUIRED BY the Act of Congress of August 24, 1912, as Amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United State Code, Section 233) of Electrical West published Monthly at Los Angeles, Calif. for October 1, 1949.

1. The names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, McGraw-Hill Company of Calif. . . . . 68 Post St., San Francisco 4, Calif.
Editor, George C. Tenney . . . . . 68 Post St., San Francisco 4, Calif.
Managing Editor, ... None
Business Manager, John W. Otterson . . . . . 68 Post St., San Francisco 4, Calif.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and addresses, as well as that of each individual member, must be given.)

McGraw-Hill Co. of Calif., San Francisco; McGraw-Hill Publishing Co. Inc., New York City; James H. McGraw Jr., New York City; Curtis McGraw, New York City; George C. Tenney, San Francisco, Calif.; John W. Otterson, San Francisco, Calif.; N. A. Bowers, San Francisco, Calif.; Willard Chevalier, New York City.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

GEORGE C. TENNEY, Editor

Sworn to and subscribed before me this 22nd day of September, 1949.

(Seal) FLORA SCHORD RICE

Notary Public in and for the City and County of San Francisco, State of California. (My commission expires September 15, 1952.)

● S. L. SPRAGGINS has been appointed to the newly created position of assistant to the president in charge of manufacturing at Hoffman Radio Corp. His former position as director of purchasing for Hoffman will be filled by ARTHUR BAXTER. Until recently Baxter served as purchasing agent for Packard-Bell Co. W. P. KENNEDY succeeds Baxter as purchasing agent for Packard-Bell.

● NEW APPOINTMENTS made by the J. T. Hill Sales Co. of Los Angeles include DICK DUNHAM, formerly with Westinghouse Electric Supply Corp., as a representative, and JIM WELLS, formerly with Radio Specialties Co., as office manager. The Hill company has been named southern California representative for Ward Products Co., a division of Gabriel Corp.

● CANADIAN GENERAL ELECTRIC CO. has awarded contract to Dominion Construction Co. Ltd., Vancouver, B. C., for a new distribution warehouse and office building at Vernon, B. C., to cost $45,000. The new building will provide offices, showroom and warehouse facilities for the company.

● HARRY MOELLER is the new field representative for the states of Oregon, Washington and California for Hamilton automatic clothes dryers, with headquarters in Portland. For the past four years he served as sales manager of the F. B. Connelly Co. in Portland.

● KENNETH CURTIS recently was appointed district merchandiser for the Sparks-Withington Co., radio-television division. He will headquarter in the Western Merchandise Mart, San Francisco, and cover the northern half of California.

● HOTPOINT INC. has set up Seattle headquarters for its Pacific Northwest sales district, including Washington, Oregon, Idaho and Montana. J. T. NOLAN has been appointed district sales manager with A. J. JAEGER as manager of utility accounts.

● LEWIS H. HOWARD, Triad Transformer Mfg. Co., Los Angeles, has moved to 2254 Sepulveda Blvd. He was formerly located at 423 N. Western Ave.

● JOHN A. ROEBLING'S SONS CO., Trenton, N. J., has announced the opening of its new Denver office and warehouse at 4801 Jackson St.

● WESIX HEATER CO. has announced the appointment of John Eiche as its Sacramento representative.

HE'S DELIVERING ANOTHER LOAD OF CENTRAL RIGID STEEL CONDUIT

CENTRAL ~~SPANS~~ CONDUIT

● Yes, you can depend on your Central Rigid Steel Conduit Distributor for rocket-fast delivery of nearly all the things he has for sale.

What's more you can depend on him for quality products and materials . . . like Central Rigid Steel Conduit. It has always been known for its fine bending, threading and cutting qualities. And the complete stock of Central Black, Cenlaco or Central White Rigid Steel Conduit carried by your distributor, makes it easy for you to get the type of electrical raceway that best suits your requirements.

When you need conduit or other electrical supplies, contact your Central Rigid Steel Conduit Distributor first . . . you'll find that he's a dependable source of supply.

SPANG-CHALFANT

Division of The National Supply Company
General Sales Office: Grant Bldg., Pittsburgh, Pa.
District Offices and Sales Representatives in Principal Cities

CENLACO a hot dipped galvanized and lacquered finish, inside and out.

CENTRAL WHITE electro-galvanized outside and black enameled inside.

CENTRAL BLACK permanent, baked-on black enamel finish, inside and out.

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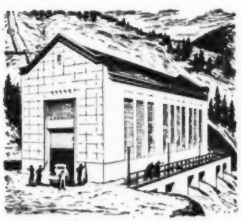
PROFILES

Joe meets the people—Joe Pengilly, that is, Square D Western division general manager and vice-president. Each month distributors and their sales forces are invited to the Los Angeles plant, given dinner, a look over the plant, get to meet his staff people personally, learn data on the products. This was the San Diego group visit; Joe Pengilly himself stands at the right in the picture above

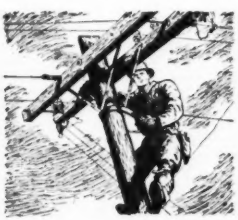
Junior home service advisors, left to right, Barbara Fort, Phyllis Harvey, Martin Hartwell and Mary Jones are being trained by Lucille Ramirez, home service director of the Washington Water Power Co. These girls were hired by the utility to take part in its experimental program of training home economics majors for home service jobs. An intensive six-week course was given on major and small appliances, followed by actual work with the regular home service advisors. Following college graduation next year these students will need only a brief refresher course to become full-fledged utility home service advisors

This familiar sight was repeated 71,000 times last year

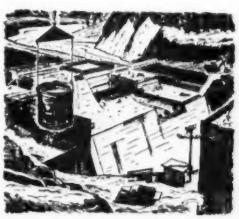
It was an all-time record . . . more than 71,000 new connections to P. G. and E. lines in one year—1948. Nearly 60,000 of them were new single-family dwelling units. That's more than the number of connections we made in the last two prewar years put together . . . a dramatic example of California's growth. In the 46 counties we serve, there are half again as many people as in 1940 . . . more than 1,500,000 new power users. It takes lots of horsepower to meet their requirements . . . and here's what we're doing to provide it:



Five new power generating plants have been brought on the line in the last thirteen months. Their combined capacity is almost 600,000 horsepower.



New power lines, built since the war to carry electricity where it's needed, would reach half-way around the earth at the equator . . . 12,000 miles.



We're rushing still more plants to meet California's future growth. By the end of 1951, we will have doubled our prewar generating capacity.

P·G·and E· PACIFIC GAS AND ELECTRIC COMPANY

EW-110-1949

Drafting room demonstrates High-level lighting

— excess of 100 footcandles maintained

In this San Francisco drafting room, high level lighting has been employed successfully to meet the demands for comfortable seeing during long periods of severe eye concentration. To accomplish this, utility lighting engineers laid out a lighting installation that delivers uniform illumination on drafting boards at a maintained level in excess of 100 footcandles.

The lighting installation consists of continuous rows of recessed troffers on four foot centers. Each troffer has two 96-inch Slimline lamps at 300 ma. Ribbed glass panels diffuse the light to produce shadowless illumination with a minimum of reflected glare and glint.

California's offices and modern industrial plants offer sales opportunities for high level lighting like this. Each such installation becomes a lighting demonstration to encourage new sales and repeat sales.

PACIFIC COAST ELECTRICAL ASSOCIATION

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